

**State of Florida
Department of Transportation**

VETERANS EXPRESSWAY (SR 589) AET PHASE 6B

SUGARWOOD PLAZA

SB & NB RAMPS at GUNN HIGHWAY

SB & NB RAMPS at HUTCHISON ROAD

FPID: 406151-4-52-01

HILLSBOROUGH COUNTY, FLORIDA

Gantry Equipment Building

HVAC Calculations and Cut Sheets

Submitted by:

URS

January 15, 2013

INDEX

Building “U” Value Calculations	1
Design Conditions	1
Gantry Building Internal heat Loads	1 - 2
Sugarwood Cooling Load Calculation Output & Input Data	3 - 7
Gunn Highway Cooling Load Calculation Output & Input Data	8 - 12
Hutchison Road Cooling Load Calculation Output & Input Data	13 – 17
Gantry Equip. Build. FL Energy Eff. Compliance Form 506-2012	18 – 24
Gantry Equip. Build. FL Energy Eff. Report Inputs	25 – 31
Gantry Equipment Building HVAC Equipment – 5 Tons	32 – 38
Gantry Equipment Building HVAC Equipment – 3 Tons	39 – 45
HVAC Equipment Dual Unit Controller	46 – 52
Gantry Equipment Building Supplemental AC Louver	53 – 56

BUILDING “U” VALUES

<u>WALLS</u>	<u>R</u>	<u>ROOF</u>	<u>R</u>
Outside Film	0.17	Outside Air Film	0.17
4” concrete	3.33	Roofing Membrane	0.34
2” Rigid Insulation	5.00	5” Rigid Insulation	19.0
¾” Plywood	0.93	4” concrete	3.33
Inside Film	<u>0.68</u>	Inside Air Film	<u>0.68</u>
	10.11		23.52
“U” Walls = 0.0989		“U” Roof = 0.0425	

DESIGN CONDITIONS

Location: Tampa, FL

ASHRAE 2009 Fundamentals, 0.4% Annual Cooling Design Conditions

	<u>SUMMER</u>		<u>WINTER</u>
	Dry Bulb	Wet Bulb	Dry Bulb
Outdoor	92.5° F	77.5° F	40° F
Indoor	75° F	62.5° F	50° F

INTERNAL BUILDING HEAT LOADS

Sugarwood Mainline Plaza Gantry Equipment Buildings:

2 – 16 KVA UPS	12,000 BTU/HR
4 – Toll Equipment Rack	10,000 Watts
1 – Communication Cabinet	2,500 Watts
2 – “C” Panel	300 Watts
1 – ATS	150 Watts
1 – SCADA Panel	300 Watts
Lights 1.7 Watts / Square Foot	390 Watts

Gunn Highway Entry and Exit Gantry Equipment Buildings:

1 – 16 KVA UPS	6,000 BTU/HR
1 – Toll Equipment Rack	2,500 Watts
1 – Communication Cabinet	2,500 Watts
1 – “C” Panel	150 Watts
1 – ATS	150 Watts
1 – SCADA Panel	300 Watts
Lights 1.7 Watts / Square Foot	390 Watts

Hutchison Road Entry and Exit Gantry Equipment Buildings:

1 – 16 KVA UPS	6,000 BTU/HR
1 – Toll Equipment Rack	2,500 Watts
1 – Communication Cabinet	2,500 Watts
1 – “C” Panel	150 Watts
1 – ATS	150 Watts
1 – SCADA Panel	300 Watts
Lights 1.7 Watts / Square Foot	390 Watts

Veterans Expressway

Location	Tampa, FL
Building owner	FTE
Program user	
Company	URS
Comments	SUGARWOOD MAINLINE GANTRY EQUIPMENT BUILDING
By	URS Corporation
Dataset name	T:\Toll Gantry\AET 6B & 6C\Mech_MJOVAET 6B\~Calcs\Load Calcs\Sugarwood\VETS XPRSWY SUGARWD GANTRY.TRC
Calculation time	12:39 PM on 09/21/2012
TRACE® 700 version	6.2.7
Location	Tampa, Florida
Latitude	28.0 deg
Longitude	82.0 deg
Time Zone	5
Elevation	19 ft
Barometric pressure	29.9 in. Hg
Air density	0.0760 lb/cu ft
Air specific heat	0.2444 Btu/lb.°F
Density-specific heat product	1.1147 Btu/h-cfm.°F
Latent heat factor	4,906.9 Btu-min/h-cu ft
Enthalpy factor	4.5604 lb-min/hr-cu ft
Summer design dry bulb	93 °F
Summer design wet bulb	78 °F
Winter design dry bulb	40 °F
Summer clearness number	0.90
Winter clearness number	0.95
Summer ground reflectance	0.20
Winter ground reflectance	0.20
Carbon Dioxide Level	400 ppm
Design simulation period	January - December
Cooling load methodology	TETD-TA1
Heating load methodology	UATD

System Checksums

By URS Corporation

AC-1

Computer Room Unit

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES			
Peaked at Time: Mo/Hr: 6 / 19				Mo/Hr: Sum of OADB: Peaks				Mo/Hr: Heating Design OADB: 40							
Outside Air: OADB/WB/HR: 87 / 73 / 100															
Envelope Loads	Space Sens. + Lat.	Plenum Sens. + Lat.	Net Total	Space Sensible	Percent Of Total	Space Sensible	Percent Of Total	Space Peak	Coil Peak	Percent Tot Sens	Percent Of Total	SADB	Cooling	Heating	
Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h						
Skylite Solar	0	0	0	0	0	0	0	0	0	0	0.00		54.2	75.0	
Skylite Cond	0	0	0	0	0	0	0	0	0	0	0.00		75.0	70.0	
Roof Cond	632	0	632	632	1	632	1	-279	-279	0	0.61		75.0	70.0	
Glass Solar	0	0	0	0	0	0	0	0	0	0	0.00		75.0	70.0	
Glass/Door Cond	55	0	55	55	0	55	0	-121	-121	0	0.26		75.0	70.0	
Wall Cond	2,488	0	2,488	2,488	4	2,488	4	-1,897	-1,897	0	4.15		75.0	70.0	
Partition/Door	0	0	0	0	0	0	0	0	0	0	0.00		0.0	0.0	
Floor	0	0	0	0	0	0	0	0	0	0	0.00		0.0	0.0	
Adjacent Floor	0	0	0	0	0	0	0	0	0	0	0.00		0.0	0.0	
Infiltration	0	0	0	0	0	0	0	0	0	0	0.00		0.0	0.0	
Sub Total ==>	3,175	0	3,175	3,175	6	3,175	6	-2,297	-2,297	0	5.02		0.1	0.0	
Internal Loads				Internal Loads								AIRFLOWS			
Lights	1,334	0	1,334	1,334	2	1,334	2	0	0	0	0.00	Diffuser	2,437	2,437	
People	0	0	0	0	0	0	0	0	0	0	0.00	Terminal	2,437	2,437	
Misc	52,103	0	52,103	52,103	91	52,103	91	0	0	0	0.00	Main Fan	2,437	2,437	
Sub Total ==>	53,437	0	53,437	53,437	94	53,437	94	0	0	0	0.00	Sec Fan	0	0	
Ceiling Load	0	0	0	0	0	0	0	0	0	0	0.00	Nom Vent	0	0	
Ventilation Load	0	0	0	0	0	0	0	0	0	0	0.00	AHU Vent	0	0	
Adj Air Trans Heat	0	0	0	0	0	0	0	0	0	0	0.00	Infil	0	0	
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0	0	0	0.00	MinStop/Rh	2,437	2,437	
Ov/Undr Sizing	0	0	0	0	0	0	0	0	0	0	0.00	Return	2,437	2,437	
Exhaust Heat	0	0	0	0	0	0	0	0	0	0	0.00	Exhaust	0	0	
Sup. Fan Heat	433	0	433	433	1	433	1	0	0	0	0.00	Rm Exh	0	0	
Ret. Fan Heat	0	0	0	0	0	0	0	0	0	0	0.00	Auxiliary	0	0	
Duct Heat PkUp	0	0	0	0	0	0	0	0	0	0	0.00	Leakage Dwn	0	0	
Underflr Sup Ht PkUp	0	0	0	0	0	0	0	0	0	0	0.00	Leakage Ups	0	0	
Supply Air Leakage	0	0	0	0	0	0	0	0	0	0	0.00	ENGINEERING CKS			
Grand Total ==>	56,612	0	57,045	56,612	100.00	56,612	100.00	-2,297	-45,761	100.00		% OA	Cooling	Heating	
												cfm/ft²	10.60	10.60	
												cfm/ton	512.61	512.61	
												ft²/ton	48.38	48.38	
												Btu/hr-ft²	248.02	-248.02	
												No. People	0	0	
COOLING COIL SELECTION				COOLING COIL SELECTION				HEATING COIL SELECTION							
Total Capacity	Sens Cap.	Coil Airflow	Enter	Leave	DB/WB/HR	DB/WB/HR	DB/WB/HR	Gross Total	Glass	ft² (%)		Capacity	Coil Airflow	Ent	Lvg
ton	MBh	cfm	°F	°F	°F	°F	°F		ft²	(%)		MBh	cfm	°F	°F
Main Clg	4.8	57.1	57.1	54.0	56.3	37.7	37.4	Floor	230			-57.1	2,437	54.0	75.0
Aux Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0			0.0	0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door	0			0.0	0	0.0	0.0
								ExFlr	0			-57.1	2,437	54.0	75.0
								Roof	230			0.0	0	0.0	0.0
								Wall	650			0.0	0	0.0	0.0
Total	4.8	57.1	57.1	54.0	56.3	37.7	37.4	Ext Door	20			-57.1	0	0.0	0.0

ENTERED VALUES

ROOM BY ROOM

By URS Corporation

Room Description: Room - 001

Zone Description: No Zone

System Description: AC-1

GENERAL INFORMATION				PEOPLE				AIRFLOW INFORMATION			
Floor Area: 230 ft²	Flr-Flr Height: 10.0 ft	Plenum Height: 0.0 ft	Height Above Flr:	People Type: None	People Sensible: 0 sq ft/person	People Latent: 250 Btu/h	People Schedule: Cooling Only (Design)	Vent Type: None	Heating	None	0.00 cfm
Slab Cnstr Type: 4" LW Concrete	Room Mass: Time delay based on actual mass	Ceiling R-Value: 0.050 hr-ft²-°F/Btu	Is There Carpet?: NO	Workstation: 1.0 workstation/person				Vent Value: 0.00 cfm	None	0.00 air changes/hr	
Design Clg DB / Drift Point: 75.0 °F / 75.0 °F	Design Htg DB / Drift Point: 70.0 °F / 65.0 °F	Design Relative Humidity: 50 %	Moisture Capacitance: Medium	Lighting Type: Fluorescent, hung below ceiling, 100% load to space				Infil Type: None	Available (100%)	To be calculated	To be calculated
Clg Tstat: None	Htg Tstat: None	Thermostat Location: Room	Floor Multiplier: 1	Fixture Type: SUSFLUOR				Infil Value: 0.00 air changes/hr	Available (100%)	To be calculated	To be calculated
Humidistat Location: Room	Room Multiplier: 1	CO2 Sensor Location: None	Room Type: Conditioned	% Load to RA: 0 %				Vav Min Airflow: Available (100%)	To be calculated	To be calculated	To be calculated
				Lighting Schedule: Cooling Only (Design)				Vav Min Sched: To be calculated	Available (100%)	Available (100%)	Available (100%)
				Lighting Amount: 1.7 W/sq ft				Aux Supply: To be calculated	Room Exhaust: To be calculated	Room Exhaust: To be calculated	Room Exhaust: To be calculated
				Ballast Factor: 1.0				Rm Exh Sched: Available (100%)			

Description	Area/ Amount	Dir	Tilt	Const Type / Schedule	U Value Btu/h-ft²-°F	Alpha	Type / Energy Type	Area ft²	Shade Coef	Glass U Value Btu/h-ft²-°F	External Shading	Internal Shading	Adj Temp/ Grnd Refl	Pct Sen/ Cool Tmp	Pct Rm/ Heat Tmp	Pct Rad Frc/ Perm Loss Len Coef
Roof - 1	230 ft²	0	90	4" LW Conc, R-19 Ins	0.0405	0.90		0			Overhang - None	None				
S	125 ft²	180	0	4" HW Concrete, R-5 Ins	0.0973	0.90										
N	125 ft²	0	0	4" HW Concrete, R-5 Ins	0.0973	0.90										
Opening - 1				Door			Standard Door	20	0.00	0.20	Overhang - None	None	0.00			
E	210 ft²	90	0	4" HW Concrete, R-5 Ins	0.0973	0.90										
W	210 ft²	270	0	4" HW Concrete, R-5 Ins	0.0973	0.90										
ATS	150.0 W			Cooling Only (Design)			None							100	100	0.60.00
SCADA Panel	300.0 W			Cooling Only (Design)			None							100	100	0.60.00
Comm Cab	2,500.0 W			Cooling Only (Design)			None							100	100	0.60.00
2 - 16 KVA UPS	12,000.0 Btu/h			Cooling Only (Design)			None							100	100	0.60.00
2 - C Panel	300.0 W			Cooling Only (Design)			None							100	100	0.60.00
4 - Toll Equip Racks	10,000.0 W			Cooling Only (Design)			None							100	100	0.60.00

Library Members

Floor - Construction Types

4" LW Concrete		4" lightweight concrete					
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
1	E0	Inside Surface Resist.					0.69 ft²·hr.°F/Btu
2	C1	4 in. LW Concrete	4.00 in.	0.10 Btu/hr·ft.°F	40.00 lb/cu ft	0.20 Btu/lb.°F	
3	E0	Inside Surface Resist.					0.69 ft²·hr.°F/Btu
Lamda = 0.89		Weight	= 13.33 lb/ft²		U-Value	= 0.213 Btu/hr·ft².°F	Alpha = 0.90
Delta = 3 hours		Heat Capacity	= 2.67 Btu/ft²·lb.°F		C-Coefficient	= 0.0900 Btu/hr·ft².°F	

Partitions - Construction Types

0.75" Gyp Frame		0.75" gypsum board frame wall					
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
1	E0	Inside Surface Resist.					0.69 ft²·hr·°F/Btu
2	E1	0.75 in. Plaster	0.75 in.	0.42 Btu/hr·ft·°F	100.00 lb/cu ft	0.20 Btu/lb·°F	
3	B0	Air Space Resistance					0.91 ft²·hr·°F/Btu
4	E1	0.75 in. Plaster	0.75 in.	0.42 Btu/hr·ft·°F	100.00 lb/cu ft	0.20 Btu/lb·°F	
5	E0	Inside Surface Resist.					0.69 ft²·hr·°F/Btu
Lamda =		1.02	Weight	=	12.50 lb/ft²		
Delta =		1 hours	Heat Capacity	=	2.50 Btu/ft²·lb·°F		
			U-Value	=	0.388 Btu/hr·ft²·°F		Alpha = 0.90
			C-Coefficient	=	0.2400 Btu/hr·ft²·°F		

Roof - Construction Types

4" LW Conc, R-19 Ins								0	
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat	Resistance		
1	M14	Outside Surface Resist. 15 nr					0.17 ft²·hr·°F/Btu		
2	M16	Modified Bitumen Membrane					0.34 ft²·hr·°F/Btu		
3	M17	4" Rigid Ins. R-20					20.00 ft²·hr·°F/Btu		
4	C1	4 in. LW Concrete	4.00 in.	0.10 Btu/hr·ft·°F	40.00 lb/cu ft	0.20 Btu/lb·°F			
5	E0	Inside Surface Resist.					0.69 ft²·hr·°F/Btu		
Lamda =		0.63	Weight	=	13.33 lb/ft²				
Delta =		4 hours	Heat Capacity	=	2.67 Btu/ft²·lb·°F				
						U-Value	=	0.041 Btu/hr·ft²·°F	
						C-Coefficient	=	0.0100 Btu/hr·ft²·°F	
						Alpha	=	0.90	

Library Members

Wall - Construction Types

4" HW Concrete, R-5 Ins		4" heavyweight concrete block, 1" insulation					
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
1	M14i	Outside Surface Resist.	15 π				0.17 ft²·hr·°F/Btu
2	C1	4 in. LW Concrete	4.00 in.	0.10 Btu/hr·ft·°F	40.00 lb/cu ft	0.20 Btu/lb·°F	
3	M18i	2" Insulation, R-5					5.00 ft²·hr·°F/Btu
4	M58	3/4 in. Plywood Sheathing	0.75 in.	0.07 Btu/hr·ft·°F	34.00 lb/cu ft	0.29 Btu/lb·°F	
5	E0	Inside Surface Resist.					0.69 ft²·hr·°F/Btu
Lamda =		0.78	Weight	= 15.46 lb/ft²	U-Value	= 0.099 Btu/hr·ft²·°F	Alpha = 0.90
Delta =		4 hours	Heat Capacity	= 3.28 Btu/ft²·lb·°F	C-Coefficient	= 0.0200 Btu/hr·ft²·°F	

Glass types

Single Clear 1/4"		Properties based on Std DS Glass				
Number of Panes	1	Visible Transmissivity	0.78	Inside Solar Reflectivity	0.13	
Shading Coeff	0.95	Inside Visible Reflectivity	0.14	Outside Long Wave Emissivity	0.84	
Glass U-Value	0.95	Solar Transmissivity	0.69	Inside Long Wave Emissivity	0.84	
Standard Door		Properties based on Spectral Data				
Number of Panes	1	Visible Transmissivity	0.00	Inside Solar Reflectivity	0.35	
Shading Coeff	0.00	Inside Visible Reflectivity	0.50	Outside Long Wave Emissivity	0.90	
Glass U-Value	0.20	Solar Transmissivity	0.00	Inside Long Wave Emissivity	0.90	

Lights

Fluorescent, hung below ceiling, 100% load to space			
Fixture Type	SUSFLUOR	Longwave Radiant Fraction	67 %
Percent Lights to RA	0 %	Shortwave Radiant Fraction	0 %
Ballast Factor	1.00		

Veterans Expressway

Location	Tampa, FL
Building owner	FTE
Program user	
Company	URS
Comments	GUNN HIGHWAY NORTHBOUND ENTRY AND SOUTH BOUND EXIT RAMPS
By	URS Corporation
Dataset name	T:\TOLL GANTRY\AET 6B & 6C\MECH_MJOAET 6B\~CALCS\LOAD CALCS\GUNN HWY\IVETS XPRSWY GUNN HWY GANTRY.TRC
Calculation time	08:07 AM on 09/21/2012
TRACE® 700 version	6.2.7
Location	Tampa, Florida
Latitude	28.0 deg
Longitude	82.0 deg
Time Zone	5
Elevation	19 ft
Barometric pressure	29.9 in. Hg
Air density	0.0760 lb/cu ft
Air specific heat	0.2444 Btu/lb.°F
Density-specific heat product	1.1147 Btu/h-cfm.°F
Latent heat factor	4,906.9 Btu-min/h-cu ft
Enthalpy factor	4.5604 lb-min/hr-cu ft
Summer design dry bulb	93 °F
Summer design wet bulb	78 °F
Winter design dry bulb	40 °F
Summer clearness number	0.90
Winter clearness number	0.95
Summer ground reflectance	0.20
Winter ground reflectance	0.20
Carbon Dioxide Level	400 ppm
Design simulation period	January - December
Cooling load methodology	TETD-TA1
Heating load methodology	UATD

System Checksums

By URS Corporation

AC-1

Computer Room Unit

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES			
Peaked at Time: Outside Air:				Mo/Hr: 6 / 19 OADB/WB/HR: 87 / 73 / 100				Mo/Hr: Heating Design OADB: 40				Cooling Heating			
Sens. + Lat.	Space	Plenum	Net	Space	Percent	Space	Percent	Space Peak	Coil Peak	Percent		SADB	Cooling	Heating	
Btu/h	Btu/h	Btu/h	Total	Sensible	Of Total	Btu/h	Of Total	Space Sens	Btu/h	(%)		Ra Plenum	55.0	75.0	
Envelope Loads	0	0	0	0	0	0	0	0	0	0.00		Fn MtrTD	75.0	70.0	
Sky/Solar	0	0	0	0	0	0	0	0	0	0.00		Return	75.0	70.0	
Sky/Solar	0	0	0	0	0	0	0	0	0	0.00		Ret/OA	75.0	70.0	
Roof Cond	632	0	632	632	2	0	0	-279	-279	1.13		Fn BldTD	0.0	0.0	
Glass Solar	0	0	0	0	0	0	0	0	0	0.00		Fn Frict	0.0	0.0	
Glass/Door Cond	55	0	55	55	0	0	0	-121	-121	0.49					
Wall Cond	2,488	0	2,488	2,488	8	0	0	-1,897	-1,897	7.67					
Partition/Door	0	0	0	0	0	0	0	0	0	0.00					
Floor	0	0	0	0	0	0	0	0	0	0.00					
Adjacent Floor	0	0	0	0	0	0	0	0	0	0.00					
Infiltration	0	0	0	0	0	0	0	0	0	0.00					
Sub Total ==>	3,175	0	3,175	3,175	11	0	0	-2,297	-2,297	9.28					
Internal Loads				Internal Loads								AIRFLOWS			
Lights	1,334	0	1,334	1,334	4	0	0	0	0	0.00		Diffuser	1,329	1,329	
People	0	0	0	0	0	0	0	0	0	0.00		Terminal	1,329	1,329	
Misc	25,113	0	25,113	25,113	84	0	0	0	0	0.00		Main Fan	1,329	1,329	
Sub Total ==>	26,447	0	26,447	26,447	89	0	0	0	0	0.00		Sec Fan	0	0	
Ceiling Load	0	0	0	0	0	0	0	0	0	0.00		Nom Vent	0	0	
Ventilation Load	0	0	0	0	0	0	0	0	0	0.00		AHU Vent	0	0	
Adj Air Trans Heat	0	0	0	0	0	0	0	0	0	0.00		Infil	0	0	
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0	0	0.00		MinStop/Rh	1,329	1,329	
Ov/Undr Sizing	0	0	0	0	0	0	0	0	0	0.00		Return	1,329	1,329	
Exhaust Heat	0	0	0	0	0	0	0	0	0	0.00		Exhaust	0	0	
Sup. Fan Heat	236	0	236	236	1	0	0	0	0	0.00		Rm Exh	0	0	
Ret. Fan Heat	0	0	0	0	0	0	0	0	0	0.00		Auxiliary	0	0	
Duct Heat PkUp	0	0	0	0	0	0	0	0	0	0.00		Leakage Dwn	0	0	
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0	0	0.00		Leakage Ups	0	0	
Supply Air Leakage	0	0	0	0	0	0	0	0	0	0.00					
Grand Total ==>	29,622	0	29,858	29,622	100.00	29,622	100.00	-2,297	-2,297	100.00					
												ENGINEERING CKS			
												Cooling Heating			
												% OA	0.0	0.0	
												cfm/ft²	5.78	5.78	
												cfm/ton	533.99	92.44	
												ft²/ton	129.82	-129.82	
												Btu/hr-ft²	0	0	
												No. People	0	0	
												HEATING COIL SELECTION			
												CapacityCoil Airflow Ent Lvg			
												MBh	cfm	°F	°F
Main Clg	2.5	29.9	29.9	1,329	75.0	56.9	40.2	54.8	48.3	39.9		-29.9	1,329	54.8	75.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0		0.0	0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0		0.0	0	0.0	0.0
Total	2.5	29.9	29.9	1,329	75.0	56.9	40.2	54.8	48.3	39.9		-29.9	1,329	54.8	75.0
												AREAS			
												Gross Total Glass ft² (%)			
												Floor			
												Part			
												Int Door			
												ExFlr			
												Roof			
												Wall			
												Ext Door			
												Total			

ENTERED VALUES

ROOM BY ROOM

By URS Corporation

Room Description: Room - 001			Zone Description: No Zone		System Description: AC-1	
GENERAL INFORMATION			PEOPLE		AIRFLOW INFORMATION	
Floor Area: 230 ft²	Flr-Flr Height: 10.0 ft		People Type: None		Cooling	Heating
Plenum Height: 0.0 ft	Height Above Flr:		# of People: 0 sq ft/person		None	None
Slab Cnstr Type: 4" LW Concrete			People Sensible: 250 Btu/h		Vent Type: 0.00 cfm	0.00 cfm
Room Mass: Time delay based on actual mass			People Latent : 250 Btu/h		Vent Schedule: Available (100%)	
Ceiling R-Value: 0.050 hr-ft²-°F/Btu			People Schedule: Cooling Only (Design)		Infil Type: None	None
Is There Carpet?: NO			Workstation: 1.0 workstation/person		Infil Value: 0.00 air changes/hr	0.00 air changes/hr
Design Clg DB / Drift Point: 75.0 °F / 75.0 °F					Infil Schedule: Available (100%)	
Design Htg DB / Drift Point: 70.0 °F / 65.0 °F					Vav Min Airflow:	
Design Relative Humidity: 50 %					Vav Min Sched:	
Moisture Capacitance: Medium					Supply: To be calculated	To be calculated
Clg Tstat: None					Aux Supply: To be calculated	To be calculated
Htg Tstat: None					Room Exhaust:	
Thermostat Location: Room	Floor Multiplier: 1				Rm Exh Sched: Available (100%)	
Humidistat Location: Room	Room Multiplier: 1					
CO2 Sensor Location: None						
Room Type: Conditioned						

Description	Area/ Amount	Dir	Tilt	Const Type / Schedule	U Value Btu/h-ft²-°F Alpha	Type / Energy Type	Glass			Adj Temp/ Grnd Refl	Pct Sen/ Cool Tmp	Pct Rm/ Heat Tmp	Pct Rad Frc/ Perm Loss Len
							Area ft²	Shade Coef	U Value Btu/h-ft²-°F				
Roof - 1	230 ft²	0	90	4" LW Conc, R-19 Ins	0.0405	0.90	0		Overhang - None				
S	125 ft²	180	0	4" HW Concrete, R-5 Ins	0.0973	0.90							
N	125 ft²	0	0	4" HW Concrete, R-5 Ins	0.0973	0.90							
Opening - 1				Door			20	0.00	0.20	Overhang - None			
E	210 ft²	90	0	4" HW Concrete, R-5 Ins	0.0973	0.90							
W	210 ft²	270	0	4" HW Concrete, R-5 Ins	0.0973	0.90							
ATS	150.0 W			Cooling Only (Design)							100	100	0.60.00
SCADA Panel	300.0 W			Cooling Only (Design)							100	100	0.60.00
1 - 16 KVA UPS	6,000.0 Btuh			Cooling Only (Design)							100	100	0.60.00
1 - C Panel	150.0 W			Cooling Only (Design)							100	100	0.60.00
Comm Cab	2,500.0 W			Cooling Only (Design)							100	100	0.60.00
1 - Toll Equip Racks	2,500.0 W			Cooling Only (Design)							100	100	0.60.00

Library Members

Floor - Construction Types

4" LW Concrete		4" lightweight concrete				
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat
1	E0	Inside Surface Resist.				
2	C1	4 in. LW Concrete	4.00 in.	0.10 Btu/hr-ft ² ·°F	40.00 lb/cu ft	0.20 Btu/lb·°F
3	E0	Inside Surface Resist.				
Lambda = 0.89		Weight	= 13.33 lb/ft ²	U-Value	= 0.213 Btu/hr-ft ² ·°F	Alpha = 0.90
Delta = 3 hours		Heat Capacity	= 2.67 Btu/ft ² ·lb·°F	C-Coefficient	= 0.0900 Btu/hr-ft ² ·°F	

Partitions - Construction Types

0.75" Gyp Frame		0.75" gypsum board frame wall				
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat
1	E0	Inside Surface Resist.				
2	E1	0.75 in. Plaster	0.75 in.	0.42 Btu/hr-ft ² ·°F	100.00 lb/cu ft	0.20 Btu/lb·°F
3	B0	Air Space Resistance				
4	E1	0.75 in. Plaster	0.75 in.	0.42 Btu/hr-ft ² ·°F	100.00 lb/cu ft	0.20 Btu/lb·°F
5	E0	Inside Surface Resist.				
Lambda = 1.02		Weight	= 12.50 lb/ft ²	U-Value	= 0.388 Btu/hr-ft ² ·°F	Alpha = 0.90
Delta = 1 hours		Heat Capacity	= 2.50 Btu/ft ² ·lb·°F	C-Coefficient	= 0.2400 Btu/hr-ft ² ·°F	

Roof - Construction Types

4" LW Conc, R-19 Ins		0				
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat
1	M14	Outside Surface Resist. 15 nr				
2	M16	Modified Bitumen Membrane				
3	M17	4" Rigid Ins. R-20				
4	C1	4 in. LW Concrete	4.00 in.	0.10 Btu/hr-ft ² ·°F	40.00 lb/cu ft	0.20 Btu/lb·°F
5	E0	Inside Surface Resist.				
Lambda = 0.63		Weight	= 13.33 lb/ft ²	U-Value	= 0.041 Btu/hr-ft ² ·°F	Alpha = 0.90
Delta = 4 hours		Heat Capacity	= 2.67 Btu/ft ² ·lb·°F	C-Coefficient	= 0.0100 Btu/hr-ft ² ·°F	

Library Members

Wall - Construction Types

4" HW Concrete, R-5 Ins		4" heavyweight concrete block, 1" insulation					
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
1	M14	Outside Surface Resist.	15 π				0.17 ft²-hr-°F/Btu
2	C1	4 in. LW Concrete	4.00 in.	0.10 Btu/hr-ft²-°F	40.00 lb/cu ft	0.20 Btu/lb-°F	
3	M18	2" Insulation, R-5					5.00 ft²-hr-°F/Btu
4	M58	3/4 in. Plywood Sheathing	0.75 in.	0.07 Btu/hr-ft²-°F	34.00 lb/cu ft	0.29 Btu/lb-°F	
5	E0	Inside Surface Resist.					0.69 ft²-hr-°F/Btu
Lamda = 0.78		Weight	= 15.46 lb/ft²		U-Value	= 0.099 Btu/hr-ft²-°F	Alpha = 0.90
Delta = 4 hours		Heat Capacity	= 3.28 Btu/ft²-lb-°F		C-Coefficient	= 0.0200 Btu/hr-ft²-°F	

Glass types

Single Clear 1/4"		Properties based on Std DS Glass			
Number of Panes	1	Visible Transmissivity	0.78	Inside Solar Reflectivity	0.13
Shading Coeff	0.95	Inside Visible Reflectivity	0.14	Outside Long Wave Emissivity	0.84
Glass U-Value	0.95	Solar Transmissivity	0.69	Inside Long Wave Emissivity	0.84
Standard Door		Properties based on Spectral Data			
Number of Panes	1	Visible Transmissivity	0.00	Inside Solar Reflectivity	0.35
Shading Coeff	0.00	Inside Visible Reflectivity	0.50	Outside Long Wave Emissivity	0.90
Glass U-Value	0.20	Solar Transmissivity	0.00	Inside Long Wave Emissivity	0.90

Lights

Fluorescent, hung below ceiling, 100% load to space			
Fixture Type	SUSFLUOR	Longwave Radiant Fraction	67 %
Percent Lights to RA	0 %	Shortwave Radiant Fraction	0 %
Ballast Factor	1.00		

Veterans Expressway

Location	Tampa, FL
Building owner	FTE
Program user	
Company	URS
Comments	HUTCHISON NORTHBOUND ENTRY AND SOUTH BOUND EXIT RAMPS
By	URS Corporation
Dataset name	T:\TOLL GANTRY\AET 6B & 6C\MECH_MJOAET 6B\~CALCS\LOAD CALC\SHUTCHISONVETS XPRSWY HUTCH GANTRY.TRC
Calculation time	02:30 PM on 10/02/2012
TRACE® 700 version	6.2.7
Location	Tampa, Florida
Latitude	28.0 deg
Longitude	82.0 deg
Time Zone	5
Elevation	19 ft
Barometric pressure	29.9 in. Hg
Air density	0.0760 lb/cu ft
Air specific heat	0.2444 Btu/lb.°F
Density-specific heat product	1.1147 Btu/h-cfm.°F
Latent heat factor	4,906.9 Btu-min/h-cu ft
Enthalpy factor	4.5604 lb-min/hr-cu ft
Summer design dry bulb	93 °F
Summer design wet bulb	78 °F
Winter design dry bulb	40 °F
Summer clearness number	0.90
Winter clearness number	0.95
Summer ground reflectance	0.20
Winter ground reflectance	0.20
Carbon Dioxide Level	400 ppm
Design simulation period	January - December
Cooling load methodology	TETD-TA1
Heating load methodology	UATD



System Checksums

By URS Corporation

AC-1

Computer Room Unit

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES			
Peaked at Time: Outside Air:				Mo/Hr: 6 / 19 OADB/WB/HR: 87 / 73 / 100				Mo/Hr: Heating Design OADB: 40				Cooling Heating			
Sens. + Lat.	Space	Plenum	Net	Space	Percent	Space	Percent	Space Peak	Coil Peak	Percent		SADB	Cooling	Heating	
Btu/h	Btu/h	Btu/h	Total	Sensible	Of Total	Btu/h	Of Total	Space Sens	Btu/h	(%)		Ra Plenum	55.0	75.0	
Envelope Loads	0	0	0	0	0	0	0	Envelope Loads	0	0	0	Return	75.0	70.0	
Skylite Solar	0	0	0	0	0	0	0	Skylite Solar	0	0	0	Ret/OA	75.0	70.0	
Skylite Cond	0	0	0	0	0	0	0	Skylite Cond	0	0	0	Fn MtrTD	0.0	0.0	
Roof Cond	632	0	632	632	2	632	2	Roof Cond	-279	0	0	Fn BldTD	0.0	0.0	
Glass Solar	0	0	0	0	0	0	0	Glass Solar	0	0	0	Fn Frict	0.1	0.0	
Glass/Door Cond	55	0	55	55	0	55	0	Glass/Door Cond	-121	0	0				
Wall Cond	2,488	0	2,488	2,488	8	2,488	8	Wall Cond	-1,897	0	0				
Partition/Door	0	0	0	0	0	0	0	Partition/Door	0	0	0				
Floor	0	0	0	0	0	0	0	Floor	0	0	0				
Adjacent Floor	0	0	0	0	0	0	0	Adjacent Floor	0	0	0				
Infiltration	0	0	0	0	0	0	0	Infiltration	0	0	0				
Sub Total ==>	3,175	0	3,175	3,175	11	3,175	11	Sub Total ==>	-2,297	0	0				
Internal Loads				Internal Loads								AIRFLOWS			
Lights	1,334	0	1,334	1,334	4	1,334	4	Lights	0	0	0	Diffuser	1,329	1,329	
People	0	0	0	0	0	0	0	People	0	0	0	Terminal	1,329	1,329	
Misc	25,113	0	25,113	25,113	84	25,113	84	Misc	0	0	0	Main Fan	1,329	1,329	
Sub Total ==>	26,447	0	26,447	26,447	89	26,447	89	Sub Total ==>	0	0	0	Sec Fan	0	0	
Ceiling Load	0	0	0	0	0	0	0	Ceiling Load	0	0	0	Nom Vent	0	0	
Ventilation Load	0	0	0	0	0	0	0	Ventilation Load	0	0	0	AHU Vent	0	0	
Adj Air Trans Heat	0	0	0	0	0	0	0	Adj Air Trans Heat	0	0	0	Infil	0	0	
Dehumid. Ov Sizing	0	0	0	0	0	0	0	Ov/Undr Sizing	0	0	0	MinStop/Rh	1,329	1,329	
Ov/Undr Sizing	0	0	0	0	0	0	0	Exhaust Heat	0	0	0	Return	1,329	1,329	
Exhaust Heat	0	0	0	0	0	0	0	OA Preheat Diff.	0	0	0	Exhaust	0	0	
Sup. Fan Heat	236	0	236	236	1	236	1	RA Preheat Diff.	0	0	0	Rm Exh	0	0	
Ret. Fan Heat	0	0	0	0	0	0	0	Additional Reheat	0	0	0	Auxiliary	0	0	
Duct Heat PkUp	0	0	0	0	0	0	0	Underflr Sup Ht PkUp	0	0	0	Leakage Dwn	0	0	
Underflr Sup Ht PkUp	0	0	0	0	0	0	0	Supply Air Leakage	0	0	0	Leakage Ups	0	0	
Supply Air Leakage	0	0	0	0	0	0	0	Grand Total ==>	-2,297	100.00	100.00				
Grand Total ==>	29,622	0	29,858	29,622	100.00	29,622	100.00	Grand Total ==>	-2,297	100.00	100.00				
COOLING COIL SELECTION				HEATING COIL SELECTION				ENGINEERING CKS							
Total Capacity	Sens Cap.	Coil Airflow	Enter	Leave	DB/WB/HR	DB/WB/HR	DB/WB/HR	Gross Total	Glass	ft²	(%)	Capacity	Coil Airflow	Ent	Lvg
ton	MBh	cfm	°F	°F	gr/lb	gr/lb	gr/lb					MBh	cfm	°F	°F
Main Clg	2.5	29.9	29.9	54.8	48.3	39.9	39.9	Floor	230			-29.9	1,329	54.8	75.0
Aux Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0			0.0	0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door	0			0.0	0	0.0	0.0
								ExFlr	0			-29.9	1,329	54.8	75.0
								Roof	230			0.0	0	0.0	0.0
								Wall	650			0.0	0	0.0	0.0
Total	2.5	29.9						Ext Door	20			-29.9	0	0.0	0.0

ENTERED VALUES

ROOM BY ROOM

By URS Corporation

Room Description: Room - 001				Zone Description: No Zone				System Description: AC-									
GENERAL INFORMATION				PEOPLE				AIRFLOW INFORMATION									
Floor Area: 230 ft² Fir-Fir Height: 10.0 ft Plenum Height: 0.0 ft Height Above Fir: 4' LW Concrete Slab Cnstr Type: 4' LW Concrete Room Mass: Time delay based on actual mass Ceiling R-Value: 0.050 hr-ft²-°F/Btu Is There Carpet?: NO Design Clg DB / Drift Point: 75.0 °F / 75.0 °F Design Htg DB / Drift Point: 70.0 °F / 65.0 °F Design Relative Humidity: 50 % Moisture Capacitance: Medium Clg Tstat: None Htg Tstat: None Thermostat Location:Room Humidistat Location:Room CO2 Sensor Location:None Room Type:Conditioned				People Type: None # of People: 0 sq ft/person People Sensible: 250 Btu/h People Latent : 250 Btu/h People Schedule: Cooling Only (Design) Workstation: 1.0 workstation/person LIGHTS Lighting Type: Fluorescent, hung below ceiling, 100% load to space Fixture Type: SUSFLUOR % Load to RA: 0 % Lighting Schedule: Cooling Only (Design) Lighting Amount: 1.7 W/sq ft Ballast Factor: 1.0				Cooling Vent Type: None Vent Value: 0.00 cfm Vent Schedule: Available (100%) Infil Type: None Infil Value: 0.00 air changes/hr Infil Schedule: Available (100%) Vav Min Airflow: Vav Min Sched: Available (100%) Supply: To be calculated Aux Supply: To be calculated Room Exhaust: To be calculated Rm Exh Sched: Available (100%)									
Description		Area/ Amount	Dir	Tilt	Const Type / Schedule	U Value Btu/h-ft²-°F	Alpha	Type / Energy Type	Area ft²	Shade Coef	Glass U Value Btu/h-ft²-°F	External Shading	Internal Shading	Adj Temp/ Grnd Refl	Pct Sen/ Cool Tmp	Pct Rm/ Heat Tmp	Pct Rad Frc/ Perm Loss Len Coef
Roof - 1		230 ft²	0	90	4* LW Conc, R-19 Ins	0.0405	0.90		0			Overhang - None		None			
S		125 ft²	180	0	4* HW Concrete, R-5 Ins	0.0973	0.90										
N		125 ft²	0	0	4* HW Concrete, R-5 Ins	0.0973	0.90										
Opening - 1					Door			Standard Door	20	0.00	0.20	Overhang - None		None	0.00		
E		210 ft²	90	0	4* HW Concrete, R-5 Ins	0.0973	0.90										
W		210 ft²	270	0	4* HW Concrete, R-5 Ins	0.0973	0.90										
ATS		150.0 W			Cooling Only (Design)			None							100	100	0.60.00
SCADA Panel		300.0 W			Cooling Only (Design)			None							100	100	0.60.00
1 - 16 KVA UPS		6,000.0 Btuh			Cooling Only (Design)			None							100	100	0.60.00
1 - C Panel		150.0 W			Cooling Only (Design)			None							100	100	0.60.00
Comm Cab		2,500.0 W			Cooling Only (Design)			None							100	100	0.60.00
1 - Toll Equip Racks		2,500.0 W			Cooling Only (Design)			None							100	100	0.60.00

Library Members

Floor - Construction Types

4" LW Concrete		4" lightweight concrete				
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat
1	E0	Inside Surface Resist.				
2	C1	4 in. LW Concrete	4.00 in.	0.10 Btu/hr-ft ² ·°F	40.00 lb/cu ft	0.20 Btu/lb·°F
3	E0	Inside Surface Resist.				
Lambda = 0.89		Weight	= 13.33 lb/ft ²	U-Value	= 0.213 Btu/hr-ft ² ·°F	Alpha = 0.90
Delta = 3 hours		Heat Capacity	= 2.67 Btu/ft ² ·lb·°F	C-Coefficient	= 0.0900 Btu/hr-ft ² ·°F	

Partitions - Construction Types

0.75" Gyp Frame		0.75" gypsum board frame wall				
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat
1	E0	Inside Surface Resist.				
2	E1	0.75 in. Plaster	0.75 in.	0.42 Btu/hr-ft ² ·°F	100.00 lb/cu ft	0.20 Btu/lb·°F
3	B0	Air Space Resistance				
4	E1	0.75 in. Plaster	0.75 in.	0.42 Btu/hr-ft ² ·°F	100.00 lb/cu ft	0.20 Btu/lb·°F
5	E0	Inside Surface Resist.				
Lambda = 1.02		Weight	= 12.50 lb/ft ²	U-Value	= 0.388 Btu/hr-ft ² ·°F	Alpha = 0.90
Delta = 1 hours		Heat Capacity	= 2.50 Btu/ft ² ·lb·°F	C-Coefficient	= 0.2400 Btu/hr-ft ² ·°F	

Roof - Construction Types

4" LW Conc, R-19 Ins		0				
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat
1	M14	Outside Surface Resist. 15 in				
2	M16	Modified Bitumen Membrane				
3	M17	4" Rigid Ins. R-20				
4	C1	4 in. LW Concrete	4.00 in.	0.10 Btu/hr-ft ² ·°F	40.00 lb/cu ft	0.20 Btu/lb·°F
5	E0	Inside Surface Resist.				
Lambda = 0.63		Weight	= 13.33 lb/ft ²	U-Value	= 0.041 Btu/hr-ft ² ·°F	Alpha = 0.90
Delta = 4 hours		Heat Capacity	= 2.67 Btu/ft ² ·lb·°F	C-Coefficient	= 0.0100 Btu/hr-ft ² ·°F	

Library Members

Wall - Construction Types

4" HW Concrete, R-5 Ins		4" heavyweight concrete block, 1" insulation					
Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
1	M14	Outside Surface Resist.	15 π				0.17 ft²·hr·°F/Btu
2	C1	4 in. LW Concrete	4.00 in.	0.10 Btu/hr·ft·°F	40.00 lb/cu ft	0.20 Btu/lb·°F	
3	M18	2" Insulation, R-5					5.00 ft²·hr·°F/Btu
4	M58	3/4 in. Plywood Sheathing	0.75 in.	0.07 Btu/hr·ft·°F	34.00 lb/cu ft	0.29 Btu/lb·°F	
5	E0	Inside Surface Resist.					0.69 ft²·hr·°F/Btu
Lamda = 0.78		Weight	= 15.46 lb/ft²	U-Value = 0.099 Btu/hr·ft²·°F		Alpha = 0.90	
Delta = 4 hours		Heat Capacity =	3.28 Btu/ft²·lb·°F	C-Coefficient = 0.0200 Btu/hr·ft²·°F			

Glass types

Single Clear 1/4"				Properties based on Std DS Glass			
Number of Panes		1		Visible Transmissivity	0.78	Inside Solar Reflectivity	0.13
Shading Coeff		0.95		Inside Visible Reflectivity	0.14	Outside Long Wave Emissivity	0.84
Glass U-Value		0.95	Btu/hr-ft² °F	Solar Transmissivity	0.69	Inside Long Wave Emissivity	0.84
Standard Door				Properties based on Spectral Data			
Number of Panes		1		Visible Transmissivity	0.00	Inside Solar Reflectivity	0.35
Shading Coeff		0.00		Inside Visible Reflectivity	0.50	Outside Long Wave Emissivity	0.90
Glass U-Value		0.20	Btu/hr-ft² °F	Solar Transmissivity	0.00	Inside Long Wave Emissivity	0.90

Lights

Fluorescent, hung below ceiling, 100% load to space			
Fixture Type	SUSFLUOR	Longwave Radiant Fraction	67 %
Percent Lights to RA	0 %	Shortwave Radiant Fraction	0 %
Ballast Factor	1.00		

Florida Energy Efficiency Code For Building Construction

EnergyGauge Summit® Fla/Com-2010, Effective Date: March 15, 2012 -- Form 506-2010
Total Building Performance Method for Commercial Buildings

PROJECT SUMMARY

Short Desc: Ganrty Eq Bldg

Description: AET 6B Gantry Equip Build.

Owner: State of Florida Department of Transportation

Address1: FTE Veterans Expressway (FL DOT)

City: Tampa

Address2: Tampa - Hillsborough County

State: FL

Zip: 34604

Type: Transportation

Class: New Finished building

Jurisdiction: HILLSBOROUGH COUNTY, HILLSBOROUGH COUNTY, FL (391000)

Conditioned Area: 230 SF

Conditioned & UnConditioned Area: 230 SF

No of Stories: 1

Area entered from Plans 230 SF

Permit No: 0

Max Tonnage 4.7

If different, write in: _____

Compliance Summary			
Component	Design	Criteria	Result
Gross Energy Cost (in \$)	138.0	389.0	PASSED
LIGHTING CONTROLS			PASSES
EXTERNAL LIGHTING			PASSES
HVAC SYSTEM			PASSES
PLANT			None Entered
WATER HEATING SYSTEMS			None Entered
PIPING SYSTEMS			None Entered
Met all required compliance from Check List?			<u>Yes</u>/No/NA
<p>IMPORTANT MESSAGE Info 5009 -- -- -- An input report of this design building must be submitted along with this Compliance Report</p>			

CERTIFICATIONS

I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code

Prepared By: Michael J. Over

Building Official: _____

Date: _____

Date: _____

I certify that this building is in compliance with the FLorida Energy Efficiency Code

Owner Agent: State of Florida Department of Tr

Date: _____

If Required by Florida law, I hereby certify (*) that the system design is in compliance with the Florida Energy Efficiency Code

Architect: Arnaldo Hernandez

Reg No: FL No 9893

Electrical Designer: Michael Roy Sakales

Reg No: FL PE 67588

Lighting Designer: Michael Roy Sakales

Reg No: FL PE 67588

Mechanical Designer: Michael J. Over

Reg No: FL PE 65665

Plumbing Designer: Michael J. Over

Reg No: FL PE 65665

(*) Signature is required where Florida Law requires design to be performed by registered design professionals.

Project: Gantry Eq Bldg
 Title: AET 6B Gantry Equip Build.
 Type: Transportation
 (WEA File: FL_TAMPA_INTERNATIONAL_AP.tm3)

Building End Uses

	1) Proposed	2) Baseline
Total	8.80	30.60
	\$138	\$486
ELECTRICITY(MBtu/kWh/\$)	8.80	30.60
	2563	8944
	\$138	\$486
AREA LIGHTS	4.00	3.60
	1176	1057
	\$63	\$57
MISC EQUIPMT	0.50	0.50
	135	135
	\$7	\$7
SPACE COOL	2.80	6.80
	806	1990
	\$43	\$108
SPACE HEAT	0.00	3.10
	0	902
	\$0	\$49
VENT FANS	1.50	16.60
	446	4860
	\$24	\$264

Credits Applied: None

Passing Criteria = 389

Design (including any credits) = 138

Passing requires Proposed Building cost to be at most 80% of
 Baseline cost. This Proposed Building is at 28.4%

PASSES

Project: Ganrty Eq Bldg Title: AET 6B Gantry Equip Build. Type: Transportation (WEA File: FL_TAMPA_INTERNATIONAL_AP.tm3)						
External Lighting Compliance						
Description	Category	Tradable?	Allowance (W/Unit)	Area or Length or No. of Units (Sqft or ft)	ELPA (W)	CLP (W)
Ext Light 1	Building facades (by linear foot)	No	5.00	67.0	335	128
Tradable Surfaces: 0 (W) Allowance for Tradable: 750 (W) All External Lighting: 128 (W) Compliance check includes a excess/Base allowance of 750.00(W)					PASSES	

Project: Ganrty Eq Bldg Title: AET 6B Gantry Equip Build. Type: Transportation (WEA File: FL_TAMPA_INTERNATIONAL_AP.tm3)						
Lighting Controls Compliance						
Acronym	Ashrae ID	Description	Area (sq.ft)	Design CP	Min CP	Compliance
Gantry Eq Bldg	1	Electrical Mechanical Equipment Room - General	230	1	1	PASSES
						PASSES

Project: Ganrty Eq Bldg Title: AET 6B Gantry Equip Build. Type: Transportation (WEA File: FL_TAMPA_INTERNATIONAL_AP.tm3)							
System Report Compliance							
GEB AC-1	System 1	Single Package Vertical A/C					No. of Units 1
Component	Category	Capacity	Design Eff	Eff Criteria	Design IPLV	IPLV Criteria	Compliance
Cooling System	Air Conditioners Single Package Vertical A/C		10.50	9.00			PASSES
Air Handling System -Supply	Air Handler (Supply) - Constant Volume		0.29	0.82			PASSES
							PASSES

Plant Compliance								
Description	Installed No	Size	Design Eff	Min Eff	Design IPLV	Min IPLV	Category	Compliance
None								

Water Heater Compliance								
Description	Type	Category	Design Eff	Min Eff	Design Loss	Max Loss	Compliance	
None								

Piping System Compliance								
Category	Pipe Dia [inches]	Is Runout?	Operating Temp [F]	Ins Cond [Btu-in/hr .SF.F]	Ins Thick [in]	Req Ins Thick [in]	Compliance	
None								

Project: Ganrty Eq Bldg
Title: AET 6B Gantry Equip Build.
Type: Transportation
(WEA File: FL_TAMPA_INTERNATIONAL_AP.tm3)

Other Required Compliance

Category	Section	Requirement (write N/A in box if not applicable)	Check
Report	506.4.2	Input Report Print-Out from EnergyGauge FlaCom attached	<input checked="" type="checkbox"/>
Operations Manual	303.3.1, 503.2.9.3, 505.7.4.2	Operations manual provided to owner	<input checked="" type="checkbox"/>
Windows & Doors	502.3.2	Glazed swinging entrance & revolving doors: max. 1.0 cfm/ft ² ; all other products: 0.3 cfm/ft ²	<input checked="" type="checkbox"/>
Joints/Cracks	502.3.3	To be caulked, gasketed, weather-stripped or otherwise sealed	<input checked="" type="checkbox"/>
Dropped Ceiling Cavity	502.3	Vented: seal & insulated ceiling. Unvented seal & insulate roof & side walls	<input checked="" type="checkbox"/>
HVAC Efficiency	503.2.3	Minimum efficiencies: Tables 503.2.3(1)-(8)	<input checked="" type="checkbox"/>
HVAC Controls	503.2.4	Zone controls prevent reheat (exceptions); separate thermostatic control per zone;	<input checked="" type="checkbox"/>
Ventilation	503.2.5	Outdoor air supply & exhaust ducts shall have dampers that automatically shut when systems or spaces served are not in use. Exhaust air energy recovery required for cooling systems (Exceptions).	<input type="checkbox"/>
ADS	503.2.7.5	Duct sizing and Design have been performed	<input type="checkbox"/>
HVAC Ducts	503.2.7	Air ducts, fittings, mechanical equipment & plenum chambers shall be mechanically attached, sealed, insulated & installed per Table 503.2.7.2. Fan power limitations.	<input checked="" type="checkbox"/>
Balancing	503.2.9.1	HVAC distribution system(s) tested & balanced. Report in construction documents.	<input checked="" type="checkbox"/>
Piping Insulation	503.2.8	HAC and service hot water. In accordance with Table 503.2.8.	<input type="checkbox"/>
Water Heaters	504	Performance requirements in accordance with Table 504.2. Heat trap required.	<input type="checkbox"/>
Swimming Pools	504.7	Vapor-retardant or liquid cover or other means proven to reduce heat loss on heated pools; Time switch (exceptions); readily accessible on/off switch.	<input type="checkbox"/>
Motors	505.7.5	Motor efficiency criteria have been met	<input checked="" type="checkbox"/>
Lighting Controls	505.2, 502.3	Automatic control required for interior lighting in buildings >5,000 s.f.; Space control; Exterior photo sensor; Tandem wiring with 1 or 3 linear fluorescent lamps>30W	<input checked="" type="checkbox"/>

EnergyGauge Summit® v4.10
INPUT DATA REPORT

Project Information

Project Name: Gantry Eq Bldg	Orientation: North	
Project Title: AET 6B Gantry Equip Build.	Building Type: Transportation	
Address: FTE Veterans Expressway (FL DOT) Tampa - Hillsborough County	Building Classification: New Finished building	
State: FL	No.of Stories: 1	
Zip: 34604	GrossArea: 230	SF
Owner: State of Florida Department of Transport		

Zones

No	Acronym	Description	Type	Area [sf]	Multiplier	Total Area [sf]
1	Eq Bldg	Gantry Equipment Bldg	CONDITIONED	230.0	1	230.0

Spaces

No	Acronym	Description	Type	Depth [ft]	Width [ft]	Height [ft]	Multi plier	Total Area [sf]	Total Volume [cf]
----	---------	-------------	------	---------------	---------------	----------------	----------------	--------------------	----------------------

Doors											
No	Description	Type	Shaded?	Width [ft]	H (Effec) [ft]	Multi plier	Area [sf]	Cond. [Btu/hr. sf. F]	Dens. [lb/cf]	Heat Cap. [Btu/sf. F]	R-Value [h.sf.F/Btu]
In Zone: Eq Bldg											
In Wall: North											
1	North Wall Door	Aluminum door, 1.25 in. polystyrene	No	3.00	6.67	1	20.0	0.1919	43.67	0.53	5.21
<div></div>											

Roofs											
No	Description	Type	Width [ft]	H (Effec) [ft]	Multi plier	Area [sf]	Tilt [deg]	Cond. [Btu/hr. Sf. F]	Heat Cap [Btu/sf. F]	Dens. [lb/cf]	R-Value [h.s.f.F/Btu]
In Zone: Eq Bldg											
1	Roof	Gantry Equip Bldg Roof	21.00	12.50	1	262.5	0.00	0.0348	10.75	50.33	28.7
<div></div>											

Skylights										
No	Description	Type	U [Btu/hr sf F]	SHGC	Vis.Trans	W [ft]	H (Effec) [ft]	Multiplier	Area [Sf]	Total Area [Sf]
In Zone: In Roof:										

Floors										
No	Description	Type	Width [ft]	H (Effec) [ft]	Multi plier	Area [sf]	Cond. [Btu/hr. sf. F]	Heat Cap. [Btu/sf. F]	Dens. [lb/cf]	R-Value [h.sf.F/Btu]
In Zone: Eq Bldg 1 Floor										
	1 ft soil, concrete floor, vinyl tile		66.67	32.00	1	2133.3	0.4219	29.33	110.00	2.37

Systems					
System 1		Single Package Vertical A/C		No. Of Units 1	
Component	Category	Capacity	Efficiency	IPLV	
1	Cooling System	56000.00	10.50		<input type="checkbox"/>
2	Air Handling System -Supply	1900.00	0.29		<input type="checkbox"/>

Plant				
Equipment	Category	Size	Inst.No	Eff. IPLV
				<input type="checkbox"/>

Water Heaters			
W-Heater Description	Capacity Cap.Unit	I/P Rt.	Efficiency Loss
			<input type="checkbox"/>

Ext-Lighting						
Description	Category	No. of Luminaires	Watts per Luminaire	Area/Len/No. of units [sf/ft/No]	Control Type	Wattage [W]
1 Ext Light 1	Building facades (by linear foot)	4	32	67.00	Photo Sensor control	128.00
						<input type="checkbox"/>

Piping						
No	Type	Operating Temperature [F]	Insulation Conductivity [Btu-in/h.sf.F]	Nomonal pipe Diameter [in]	Insulation Thickness [in]	Is Runout?

<input type="checkbox"/>

Fenestration Used				
Name	Glass Type	No. of Panels	Glass Conductance [Btu/h.sf.F]	SHGC VLT

Materials Used							
Mat No	Acronym	Description	Only R-Value Used	RValue [h.sf.F/Btu]	Thickness [ft]	Conductivity [Btu/h.ft.F]	Density [lb/cf] SpecificHeat [Btu/lb.F]
264	Matl264	ALUMINUM, 1/16 IN	No	0.0002	0.0050	26.0000	480.00 0.1000
214	Matl214	POLYSTYRENE, EXP., 1-1/4IN,	No	5.2100	0.1042	0.0200	1.80 0.2900
151	Matl151	CONC HW, DRD, 140LB, 4IN	No	0.4403	0.3333	0.7570	140.00 0.2000
265	Matl265	Soil, 1 ft	No	2.0000	1.0000	0.5000	100.00 0.2000
159	Matl159	CONC	No	0.3202	0.3333	1.0410	140.00 0.2000
94	Matl94	HW-UNDRD-140LB-4IN BUILT-UP ROOFING, 3/8IN	No	0.3366	0.0313	0.0930	70.00 0.3500
407	Matl407	R-19 Generic Insulation	No	19.0000	0.4147	0.0218	0.30 0.2000
414	Matl414	R-8 generic Insulation	No	8.0000	0.1746	0.0218	0.30 0.2000
1002	ApLbMat1002	LINOLEUM TILE	Yes	0.0500			
1004	ApLbMat1004	PLYWOOD, 3/4IN	No	0.9470	0.0625	0.0660	34.00 0.2900

Constructs Used					
No	Name	Simple Construct	Massless Construct	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F] Density [lb/cf] RValue [h.sf.F/Btu]

1002	Aluminum door, 1.25 in. polystyrene										No	No	0.19	0.53	43.67	5.2	<input type="checkbox"/>
Layer	Material No.	Material	Simple Construct	Massless Construct	Thickness [ft]	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]								
1	264	ALUMINUM, 1/16 IN			0.0050	0.000				<input type="checkbox"/>							
2	214	POLYSTYRENE, EXP., 1-1/4IN,			0.1042	0.000				<input type="checkbox"/>							
3	264	ALUMINUM, 1/16 IN			0.0050	0.000				<input type="checkbox"/>							
No	Name		Simple Construct	Massless Construct	Thickness [ft]	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]								
1061	1 ft soil, concrete floor, vinyl tile										No	No	0.42	29.33	110.00	2.4	<input type="checkbox"/>
Layer	Material No.	Material	Simple Construct	Massless Construct	Thickness [ft]	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]								
1	265	Soil, 1 ft			1.0000	0.000				<input type="checkbox"/>							
2	159	CONC HW-UNDRD-140LB-4IN			0.3333	0.000				<input type="checkbox"/>							
3	1002	LINOLEUM TILE				0.000				<input type="checkbox"/>							
No	Name		Simple Construct	Massless Construct	Thickness [ft]	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]								
1062	Gantry Equip Bldg Wall										No	No	0.11	9.96	85.62	9.4	<input type="checkbox"/>
Layer	Material No.	Material	Simple Construct	Massless Construct	Thickness [ft]	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]								
1	151	CONC HW, DRD, 140LB, 4IN			0.3333	0.000				<input type="checkbox"/>							
2	414	R-8 generic Insulation			0.1746	0.000				<input type="checkbox"/>							
3	1004	PLYWOOD, 3/4IN			0.0625	0.000				<input type="checkbox"/>							

No	Name	Simple Construct	Massless Construct	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]
1063	Gantry Equip Bldg Roof	No	No	0.03	10.75	50.33	28.7
Layer	Material No.	Material	Thickness [ft]	Framing Factor			
1	94	BUILT-UP ROOFING, 3/8IN	0.0313	0.000			
2	407	R-19 Generic Insulation	0.4147	0.000			
3	151	CONC HW, DRD, 140LB, 4IN	0.3333	0.000			
4	414	R-8 generic Insulatriton	0.1746	0.000			
5	1004	PLYWOOD, 3/4IN	0.0625	0.000			



ComPac® I & ComPac® II 2 to 6 Ton Vertical Wall Mount Air Conditioners

R-410A
Refrigerant

Models AVPA24-30-36-42-48-60-72 (Single Stage Compressor)

Models HVEA24-30-36-42-49-60 (Single Stage Compressor)

Models HVESA36-42-49-60 (2-Stage Compressor)

General Description

The Marvair® ComPac® I and ComPac® II air conditioners are used primarily to cool electronic and communication equipment shelters. Due to the high internal heat load, these shelters require cooling even when outside temperatures drop below 60°F (15°C). The ComPac I and ComPac II air conditioners have the necessary controls and components for operation during these (less than 60°F [15°C]) temperatures. All models use the non-ozone depleting R-410A refrigerant.

The primary difference between the ComPac I and the ComPac II units is that the ComPac® II air conditioner has a factory installed economizer. When cool and dry, the economizer uses outside air to cool the shelter. The economizer provides temperature control, energy cost savings, and increased reliability by decreasing the operating hours of the compressor and the condenser fan. The ComPac I and ComPac II air conditioners are problem solvers for a wide range of conditions and applications. To insure proper operation and optimum performance, all economizers are non-removable, factory installed and tested. In addition, factory and field installed accessories can be used to meet specific requirements.

The HVEA and HVESA models are Marvair's most efficient wall mount air conditioners. Electronically commutated outdoor fan motors combined with highly efficient scroll compressors result in Energy Efficiency Ratios (EER's) of up to 11.75.

Models HVESA36-42-49-60 have a 2-stage compressor with first stage cooling approximately 65% of the total cooling capacity. The 2-stage compressor provides lower start-up amps which can be critical when operating with a generator. The two stage compressor can also reduce energy costs and is able to more precisely match the cooling capacity of the air conditioner with the heat load in the shelter. Both ComPac I and ComPac II units are available with 2 stage compressors.



AVPA36ACA-100C



Safety Listed and Energy Certified

All ComPac air conditioners are built to UL standard 1995, 2nd edition and CAN/CSA C22, No. 236-5, 2nd edition. For energy efficiency and performance, the units are tested and rated in accordance to the ANSI/ARI (Air-Conditioning and Refrigeration Institute) Standard 390- 2003 (Single Package Vertical Units). All units meet or exceed the efficiency requirements of ANSI/ASHRAE/IESNA 90.1.2007. The ComPac I and ComPac II air conditioners are commercial units and are not intended for use in residential applications.

*ComPac® II air conditioner only

Standard Features

Designed for Operation in Low Ambient Conditions

- Low ambient control cycles condenser fan to maintain proper refrigerant pressures. Allows operation in mechanical cooling (compressor) down to 0°F (-18°C). Note: low temperature operation is affected by ambient conditions, e.g. wind and humidity.
- Three minute by-pass of the low pressure switch for start-up of compressor when outdoor temperatures are below 55°F (13°C).
- Factory built-in economizer.*

High Efficiency

- High efficiency compressor.
- Lanced fins and rifled tubing on many condenser & evaporator coils.

Built-in Reliability

- High pressure switch and low pressure switch with lockout protects refrigerant circuit.

*ComPac® II air conditioner only

- Three minute delay on make for short cycle protection.

Remote Alarm Capability

- Dry contacts can be used for remote alarm or notification upon air conditioner lockout.

Ease of Installation

- Sloped top with flashing eliminates need of rainhood.
- Built-in mounting flanges facilitate installation and minimize chance of water leaks.
- Supply and return openings exactly match previous models.
- Factory installed disconnect on all units.

Rugged Construction

- Copper tube, aluminum fin evaporator & condenser coils.
- Factory installed heaters on discharge side of evaporator coil (optional)
- Baked on neutral beige finish over galvalume steel for maximum

cabinet life. (Other finishes are available.)

Ease of Service

- Service access valves are standard.
- Standard 2" (50 mm) pleated filter with a MERV rating of 7 changeable from outside.
- All major components are readily accessible.
- Front Control Panel allows easy access and complies with NEC clearance codes on redundant side-by-side systems.
- LEDs indicate operational status and fault conditions.

A Marvair® First – Factory Installed Economizer

Marvair's ComPac® II air conditioner has been the industry standard since its introduction in 1986. Tens of thousands of ComPac II air conditioners are in operation from the metropolitan areas of North America to the deserts of the Mid-East to the Siberian tundra. Here's how the economizer works:

On a signal from the wall mounted indoor thermostat that cooling is required, either mechanical cooling with the compressor or free cooling with the economizer is provided. A factory installed enthalpy controller determines whether the outside air is sufficiently cool and dry to be used for cooling. If suitable, the compressor is locked out and the economizer damper opens to bring in outside air. Integral pressure relief allows the interior air to exit the shelter, permitting outside air to enter the shelter. The temperature at which the economizer opens is adjustable from 52°F (12°C) at 50% Relative Humidity to 78°F (26°C) at 50% Relative Humidity.

After the enthalpy control has activated and outside air is being brought into the building, the mixed air sensor measures the temperature of the air entering the indoor blower and then modulates the economizer damper to mix the right proportion of cool outside air with warm indoor air to maintain 50-56°F (10 - 13°C) air being delivered to the building. This prevents shocking the electronic components with cold outside air. The compressor is not permitted to operate when the economizer is functioning.

If the outside air becomes too hot or humid, the economizer damper closes completely, or to a minimum open position with an optional minimum position potentiometer, and mechanical cooling is activated.

Unlike other economizers, the Marvair 100% economizer cycle provides the same quantity of outside air (CFM) as is provided in mechanical cooling (compressor operation). The 100% economizer increases the savings by taking full advantage of using outside air to cool the shelter.

Controllers and Thermostats

Controllers

CommStat 4 Telecom HVAC Controller

P/N S/7846

The CommStat 4 HVAC controller is designed specifically for controlling two redundant air conditioners, heat pumps or air conditioners with 2-stage compressors in a telecommunication shelter. The CommStat 4 has seven outputs for remote alarms or notification. Status LED's indicate HEAT, COOL, POWER and the LEAD unit. When a fault is detected, an alarm LED flashes and the LCD screen displays the fault.

The CommStat 4 uses RS-485 communications via a RJ11 jack. It is capable of interfacing with a secondary control board which can interpret Marvair's communication protocol and provide Internet capability. (Note: the end user must provide the interface board and the Graphical User Interface (GUI) software to gain access via the Internet). It can be daisy chained with a second CommStat 4 controllers for controlling up to four air conditioners in one shelter. When two CommStat 4 controllers are daisy chained together, one is the MASTER and the other controller is the SLAVE. Any settings to the MASTER unit immediately take effect on the SLAVE unit. See the CommStat 4 Product Data Sheet for complete details.

CommStat3™ Lead/Lag Microprocessor Controller

P/N S/04581

Solid state controller designed to operate a fully or partially redundant air conditioning system. Insures equal wear on both air conditioners while allowing the lag unit to assist upon demand. Lead/lag changeover is factory set at 7 days, but is field programmable in 1/2 day increments from 1/2 to 7 days. The CommStat 3™ Controller has LED's to indicate status & function, digital display of temperature, a comfort override button for energy

savings, five alarm relays, a built in temperature sensor and is fully programmable. See CommStat 3™ Controller Product Data Sheet for details on operation & installation.

LL357D4 Lead/Lag Controller

Two stage heat and cool thermostat with solid state module for redundant operation. (See the LL357D4 Product Data Sheet for details.)

Thermostats & Thermostat Guards

Note: All air conditioners with 2-stage compressors, models HVESA, require a 2 stage cooling thermostat.

Thermostat P/N 50123

Digital thermostat. 1 stage heat, 1 stage cool. 7 day programmable. Fan switch: Auto & On. Auto-change over. Keypad lockout. Non-volatile program memory.

Thermostat P/N 50107

Digital thermostat. 2 stage heat, 2 stage cool. 7 day programmable. Fan switch: Auto & On. Auto-change over. Status LED's. Backlit display. Programmable fan. Non-volatile program memory.

Thermostat Guard P/N 50092

Thermostat guard for use with the 50123 and 50107 thermostats.

Thermostat P/N 50186

Digital, non-programmable thermostat. 1 stage cool and 1 stage heat. Auto-changeover.

Digital Humidistat P/N 50254

To be used with units with hot gas or electric reheat. Programmable dehumidistat and ventilation controller. Time of day can be set for dehumidifier or ventilation to run. Permanent memory retention of set points. Humidity sensor can be field calibrated. High & low dehumidification set points. Outdoor temperature and humidity sensor included. °F or °C selectable.

Accessories

Supply Grilles

For AVPA20/24

20" x 8" (508 mm x 203 mm) P/N 80674

For AVPA30,36 and HVEA24

28" x 8" (711 mm x 203 mm) P/N 80675

For AVPA42,48,60,72 and HVEA30, 36, 42, 49, 60

30" x 10" (762 mm x 254 mm) P/N 80676

Return Grilles

For AVPA20/24

20" x 12" (508 mm x 305 mm) P/N 80677

For AVPA30,36 and HVEA24

28" x 14" (711 mm x 356 mm) P/N 80678

For AVPA42,48,60,72 and HVEA30, 36, 42, 49, 60

30" x 16" (762 mm x 406 mm) P/N 80679

Return Filter Grilles

Used when filter must be changed from the interior.

Not recommended for ComPac® II air conditioner.

Note: Filter used in Return Filter Grille is 1" (25 mm) thick.

For AVPA20/24

20" x 12" (508 mm x 305 mm) P/N 80671

For AVPA30,36 and HVEA24

28" x 14" (711 mm x 356 mm) P/N 80672

For AVPA42,48,60,72 and HVEA30, 36, 42, 49, 60

30" x 16" (762 mm x 406 mm) P/N 80673

Model Identification

● VP	S	A	●	AC	●	●	●
A = Air Source Vertical Package H = High Efficiency Vertical Package	2-Stage Compressor	Refrigerant A = R410A	Nominal Cooling 24 = 24,000 BTUH 30 = 30,000 BTUH 36 = 36,000 BTUH 42 = 42,000 BTUH 48/49 = 48,000 BTUH 60 = 60,000 BTUH 72 = 72,000 BTUH	System Type Air Conditioner	Power Supply A = 208/230V, 1ø, 60Hz C = 208.230V, 3ø, 60Hz D = 460V, 3ø, 60Hz	Configuration N = ComPac® I A/C C = ComPac® II A/C	Special Option Code R = Electric Reheat U = Scroll Comp.
				Electric Heat – kW 000 = No Heat 090 = 9 kW 040 = 4 kW 100 = 10 kW 050 = 5 kW 150 = 15 kW 080 = 8 kW			

Certified Efficiency and Capacity Ratings at ANSI/AHRI Standard 390 - AVPA Air Conditioners



Model Number	AVPA24			AVPA30			AVPA36			AVPA42			AVPA48			AVPA60			AVPA72			AVPA72		
	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD
Cooling BTUH ¹	24,000			29,000			35,000			42,000			46,500			54,500			62,000			70,000		
EER ²	9.25			9.25			9.25			9.25			9.50			9.25			10.00			10.00		
Rated Air Flow (CFM ³)	840			1,000			1,220			1,575			1,760			1,850			2,050			2,050		
ESP ⁴ @ Rated Conditions	0.10			0.15			0.15			0.15			0.20			0.20			0.20			0.20		

¹Cooling rated at 95°F (35°C) outdoor and 80°F DB/67° WB (26.5°C DB/19.5°C WB) return air. ²EER=Energy Efficiency Ratio
³CFM=Cubic Feet per Minute ⁴ESP=External Static Pressure
Ratings are with no outside air. Performance will be affected by altitude.
Ratings are at 230 volts for 208/230 volt units ("A" & "C" models) and 460 volts for "D" models. Operation of units at a different voltage from that of the rating point will affect performance and air flow.

Sensible Total Heat Ratio @ 95°F (35°C) Outside Air Dry Bulb - AVPA Air Conditioners

Model Number	AVPA24			AVPA30			AVPA36			AVPA42			AVPA48			AVPA60			AVPA72			AVPA72		
	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD
Total Capacity	24,000			29,000			35,000			42,000			46,500			54,500			62,000			70,000		
Sensible Heat Ratio	0.71			0.75			0.69			0.75			0.76			0.72			0.71			0.66		
Sensible Capacity	16,950			21,740			24,155			31,640			35,125			39,000			43,815			46,190		
Rated Air Flow (CFM ¹)	840			1,000			1,220			1,575			1,760			1,850			2,050			2,050		

¹CFM=Cubic Feet per Minute. Sensible heat ratios based upon ANSI/AHRI std. 390 outdoor air conditions of 95°F (35°C) and 80°F DB/67° WB (26.5°C DB/19.5°C WB) return air.

Cooling Performance (BTUH) at Various Outdoor Temperatures - AVPA Air Conditioners

Model Number	Outdoor Temperature									
	75°F / 24°C	80°F / 26.5°C	85°F / 29°C	90°F / 32°C	95°F / 35°C	100°F / 38°C	105°F / 40.5°C	110°F / 43.3°C	115°F / 46°C	
AVPA24AC	27,840	26,880	25,920	24,960	24,000	23,040	22,080	21,120	20,640	
AVPA30AC	33,600	32,480	31,320	30,160	29,000	27,840	26,680	25,520	24,940	
AVPA36AC	40,600	39,200	37,800	36,400	35,000	33,600	32,200	30,800	30,100	
AVPA42AC	48,720	47,040	45,360	43,680	42,000	40,320	38,640	36,960	36,120	
AVPA48AC	53,940	52,080	50,220	48,360	46,500	44,640	42,780	40,920	39,900	
AVPA60AC	63,220	61,040	58,860	56,680	54,500	52,320	50,140	47,960	46,870	
AVPA72ACA	71,920	69,440	66,960	64,480	62,000	59,520	57,040	54,560	53,320	
AVPA72ACC, ACD	81,200	78,400	75,600	72,800	70,000	67,200	64,400	61,600	60,200	

Based upon ANSI/AHRI std. 390 return air conditions of 80°F DB/67° WB (26.5°C DB/19.5°C WB) at various outdoor temperatures.

Certified Efficiency and Capacity Ratings at ANSI /AHRI Standard 390 for HVESA Air Conditioners with 2-Stage Compressors



Model Number	HVESA36			HVESA42			HVESA49			HVESA60		
	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD
Cooling BTUH ¹ - 2nd Stage	35,000			39,000			47,000			56,000		
EER ² - 2nd Stage	11.00			10.50			11.75			10.50		
Integrated Part Load Value ³	16.0			14.1			16.0			14.8		
Rated Air Flow (CFM ⁴)	1,300			1,400			1,750			1,900		
ESP ⁵ @ Rated Conditions	0.15			0.15			0.20			0.20		

¹Cooling rated at 95°F (35°C) outdoor and 80°F DB/67° WB (26.5°C DB/19.5°C WB) return air.

²EER=Energy Efficiency Ratio

³Integrated Part Load Value is an integrated efficiency measure from 1st and 2nd stage capacity modulation.

⁴CFM=Cubic Feet per Minute

⁵ESP=External Static Pressure

Ratings are with no outside air. Performance will be affected by altitude.

Ratings are at 230 volts for 208/230 volt units ("A" & "C" models) and 460 volts for "D" models. Operation of units at a different voltage from that of the rating point will affect performance and air flow.

Sensible Total Heat Ratio @ 95°F (35°C) Outside Air Dry Bulb - HVESA Air Conditioners with 2-Stage Compressors

Model Number	HVESA36			HVESA42			HVESA49			HVESA60		
	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD
Total Capacity	35,000			39,000			47,000			56,000		
Sensible Heat Ratio	0.70			0.71			0.79			0.77		
Sensible Capacity	24,445			27,590			36,920			43,235		
Rated Air Flow (CFM ¹)	1,300			1,400			1,750			1,900		
¹ CFM=Cubic Feet per Minute Sensible heat ratios based upon ANSI/AHRI std. 390 outdoor air conditions of 95°F (35°C) and 80°F DB/67° WB (26.5°C DB/19.5°C WB) return air.												

Stage 2 Cooling Performance (BTUH) at Various Outdoor Temperatures

Model Number	Outdoor Temperature				
	75°F / 24°C	80°F / 26.5°C	85°F / 29°C	90°F / 32°C	95°F / 35°C
HVESA36AC	40,600	39,200	37,800	36,400	35,000
HVESA42AC	45,240	43,680	42,120	40,560	39,000
HVESA49AC	54,520	52,640	50,760	48,880	47,000
HVESA60AC	64,960	62,720	60,480	58,240	56,000
Based upon ANSI/AHRI std. 390 return air conditions of 80°F DB/67° WB (26.5°C DB/19.5°C WB) at various outdoor temperatures.					

Stage 1 Cooling Performance (BTUH) at Various Outdoor Temperatures

Model Number	Outdoor Temperature				
	75°F / 24°C	80°F / 26.5°C	85°F / 29°C	90°F / 32°C	95°F / 35°C
HVESA36AC	30,856	29,792	28,728	27,664	26,600
HVESA42AC	34,336	33,152	31,968	30,784	29,600
HVESA49AC	44,080	42,560	41,040	39,520	38,000
HVESA60AC	51,040	49,280	47,520	45,760	44,000
Based upon ANSI/AHRI std. 390 return air conditions of 80°F DB/67° WB (26.5°C DB/19.5°C WB) at various outdoor temperatures.					

Electrical Characteristics - Compressor, Fan & Blower Motors - HVESA Air Conditioner with 2-Stage Compressor

BASIC MODEL	Type	COMPRESSOR			OUTDOOR FAN MOTOR				INDOOR FAN MOTOR (ECM ⁶)			
		VOLTS-HZ-PH	RLA ¹	LRA ²	VOLTS-HZ-PH	RPM ³	FLA ⁴	HP ⁵	VOLTS-HZ-PH	RPM ³	FLA ⁴	HP ⁵
HVESA36ACA	SCROLL	208/230-60-1	16.6	82.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA42ACA		208/230-60-1	16.6	96.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA49ACA		208/230-60-1	21.1	96.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA60ACA		208/230-60-1	25.6	118.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA36ACC	SCROLL	208/230-60-3	11.1	58.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA42ACC		208/230-60-3	13.4	88.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA49ACC		208/230-60-3	13.4	88.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA60ACC		208/230-60-3	17.6	123.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA36ACD	SCROLL	460-60-3	4.5	29.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA42ACD		460-60-3	6.1	44.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA49ACD		460-60-3	6.4	41.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA60ACD		460-60-3	9.0	62.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4

¹RLA = Rated Load Amps ²LRA = Locked Rotor Amps ³RPM = Revolutions per Minute ⁴FLA = Full Load Amps ⁵HP = Horsepower ⁶ECM = Electronically Commutated Motor
The 460 volt units have a step down transformer for the 230 volt motors.

Summary Electrical Ratings (Wire Sizing) - HVESA Air Conditioner with 2-Stage Compressor Manual Damper ("N") or Economizer ("C")

ELECTRIC HEAT		000 = None		040 = 4 kw		050 = 5 kw		060 = 6 kw		080 = 8 kw		090 = 9 kw		100 = 10 kw		120 = 12 kw				150 = 15 kw			
BASIC MODEL	VOLTAGE PHASE	CKT #1		CKT #1		CKT #1		CKT #1		CKT #1		CKT #1		CKT #1		CKT #1		CKT #2		CKT #1		CKT #2	
		MCA¹	MFS²	MCA¹	MFS²	MCA¹	MFS²	MCA¹	MFS²	MCA¹	MFS²	MCA¹	MFS²	MCA¹	MFS²	MCA¹	MFS²	MCA¹	MFS²	MCA¹	MFS²	MCA¹	MFS²
HVESA36ACA	208-230/1	26.4	40	26.4	40	28.8	40	34.1	40	44.4	45	n/a	n/a	54.9	60	26.4	40	41.6	45	28.8	40	52.1	60
HVESA42ACA	208-230/1	26.4	40	n/a	n/a	28.8	40	n/a	n/a	n/a	n/a	n/a	n/a	54.9	60	26.4	40	41.6	45	28.8	40	52.1	60
HVESA49ACA	208-230/1	33.5	50	n/a	n/a	33.5	50	n/a	n/a	n/a	n/a	n/a	n/a	56.4	60	33.5	50	41.6	45	33.5	50	52.1	60
HVESA60ACA	208-230/1	39.4	60	n/a	n/a	39.4	60	n/a	n/a	n/a	n/a	n/a	n/a	56.4	60	39.4	60	41.6	45	39.4	60	52.1	60
HVESA36ACC	208-230/3	19.5	25	n/a	n/a	n/a	n/a	20.8	25	n/a	n/a	29.9	30	n/a	n/a	38.9	40	n/a	n/a	47.9	50	n/a	n/a
HVESA42ACC	208-230/3	22.4	30	n/a	n/a	n/a	n/a	22.4	30	n/a	n/a	29.9	30	n/a	n/a	38.9	40	n/a	n/a	47.9	50	n/a	n/a
HVESA49ACC	208-230/3	23.9	35	n/a	n/a	n/a	n/a	23.9	35	n/a	n/a	31.4	35	n/a	n/a	40.4	45	n/a	n/a	49.4	50	n/a	n/a
HVESA60ACC	208-230/3	29.4	45	n/a	n/a	n/a	n/a	30.0	45	n/a	n/a	31.4	45	n/a	n/a	40.4	45	n/a	n/a	49.4	50	n/a	n/a
HVESA36ACD	460/3	8.4	15	n/a	n/a	n/a	n/a	10.4	15	n/a	n/a	14.9	15	n/a	n/a	19.4	20	n/a	n/a	23.9	25	n/a	n/a
HVESA42ACD	460/3	10.4	15	n/a	n/a	n/a	n/a	10.4	15	n/a	n/a	14.9	15	n/a	n/a	19.4	20	n/a	n/a	23.9	25	n/a	n/a
HVESA49ACD	460/3	11.6	15	n/a	n/a	n/a	n/a	11.6	15	n/a	n/a	15.7	20	n/a	n/a	20.2	25	n/a	n/a	24.7	25	n/a	n/a
HVESA60ACD	460/3	14.8	20	n/a	n/a	n/a	n/a	14.8	20	n/a	n/a	15.7	20	n/a	n/a	20.2	25	n/a	n/a	24.7	25	n/a	n/a

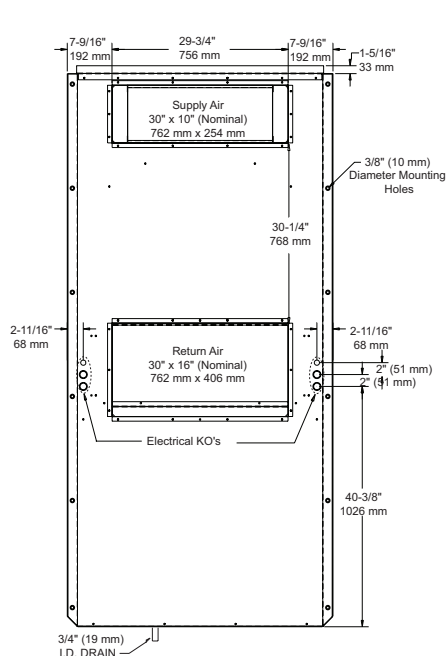
¹MCA = Minimum Circuit Ampacity (Wiring Size Amps)

²MFS = Maximum Fuse Size or HACR breaker

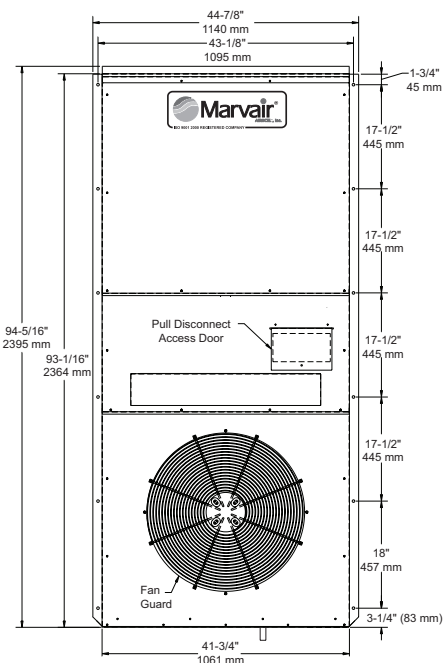
This chart should only be used as a guideline for estimating conductor size and overcurrent protection. Always refer to the data label on the unit for the requirements of the specific unit. MCA & MFS are calculated at 230v. for the 208-230v units (A & C models) and at 460 volt for the 460v. units (D models).

All 460 units will have a step down transformer for the 230 volts motors.

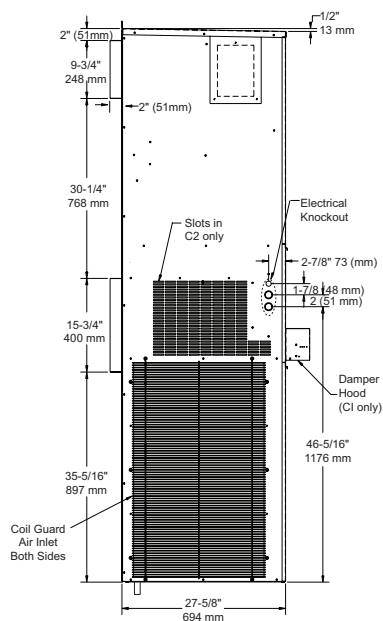
Dimensional Data - AVPA72, and HVEA49/60, HVESA49/60 ComPac® I & ComPac® II Air Conditioners



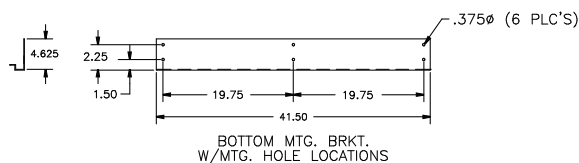
BACK VIEW



FRONT VIEW



LEFT SIDE VIEW



SHIP WEIGHT (LBS/KG)

MODEL	AVPA 72	HVEA/HVESA 49	60
COMPAC I (LBS/KG)	600/272	610/277	625/284
COMPAC II (LBS/KG)	640/290	625/284	640/290

FILTER SIZE

MODEL	AVPA72 & HVEA/HVESA49/60
FILTER SIZE (IN)	18 x 24 x 2
FILTER SIZE (MM)	452 x 610 x 51



ComPac® I & ComPac® II 2 to 6 Ton Vertical Wall Mount Air Conditioners

R-410A
Refrigerant

Models AVPA24-30-36-42-48-60-72 (Single Stage Compressor)

Models HVEA24-30-36-42-49-60 (Single Stage Compressor)

Models HVESA36-42-49-60 (2-Stage Compressor)

General Description

The Marvair® ComPac® I and ComPac® II air conditioners are used primarily to cool electronic and communication equipment shelters. Due to the high internal heat load, these shelters require cooling even when outside temperatures drop below 60°F (15°C). The ComPac I and ComPac II air conditioners have the necessary controls and components for operation during these (less than 60°F [15°C]) temperatures. All models use the non-ozone depleting R-410A refrigerant.

The primary difference between the ComPac I and the ComPac II units is that the ComPac® II air conditioner has a factory installed economizer. When cool and dry, the economizer uses outside air to cool the shelter. The economizer provides temperature control, energy cost savings, and increased reliability by decreasing the operating hours of the compressor and the condenser fan. The ComPac I and ComPac II air conditioners are problem solvers for a wide range of conditions and applications. To insure proper operation and optimum performance, all economizers are non-removable, factory installed and tested. In addition, factory and field installed accessories can be used to meet specific requirements.

The HVEA and HVESA models are Marvair's most efficient wall mount air conditioners. Electronically commutated outdoor fan motors combined with highly efficient scroll compressors result in Energy Efficiency Ratios (EER's) of up to 11.75.

Models HVESA36-42-49-60 have a 2-stage compressor with first stage cooling approximately 65% of the total cooling capacity. The 2-stage compressor provides lower start-up amps which can be critical when operating with a generator. The two stage compressor can also reduce energy costs and is able to more precisely match the cooling capacity of the air conditioner with the heat load in the shelter. Both ComPac I and ComPac II units are available with 2 stage compressors.



AVPA36ACA-100C



Safety Listed and Energy Certified

All ComPac air conditioners are built to UL standard 1995, 2nd edition and CAN/CSA C22, No. 236-5, 2nd edition. For energy efficiency and performance, the units are tested and rated in accordance to the ANSI/ARI (Air-Conditioning and Refrigeration Institute) Standard 390- 2003 (Single Package Vertical Units). All units meet or exceed the efficiency requirements of ANSI/ASHRAE/IESNA 90.1.2007. The ComPac I and ComPac II air conditioners are commercial units and are not intended for use in residential applications.

*ComPac® II air conditioner only

Standard Features

Designed for Operation in Low Ambient Conditions

- Low ambient control cycles condenser fan to maintain proper refrigerant pressures. Allows operation in mechanical cooling (compressor) down to 0°F (-18°C). Note: low temperature operation is affected by ambient conditions, e.g. wind and humidity.
- Three minute by-pass of the low pressure switch for start-up of compressor when outdoor temperatures are below 55°F (13°C).
- Factory built-in economizer.*

High Efficiency

- High efficiency compressor.
- Lanced fins and rifled tubing on many condenser & evaporator coils.

Built-in Reliability

- High pressure switch and low pressure switch with lockout protects refrigerant circuit.

*ComPac® II air conditioner only

- Three minute delay on make for short cycle protection.

Remote Alarm Capability

- Dry contacts can be used for remote alarm or notification upon air conditioner lockout.

Ease of Installation

- Sloped top with flashing eliminates need of rainhood.
- Built-in mounting flanges facilitate installation and minimize chance of water leaks.
- Supply and return openings exactly match previous models.
- Factory installed disconnect on all units.

Rugged Construction

- Copper tube, aluminum fin evaporator & condenser coils.
- Factory installed heaters on discharge side of evaporator coil (optional)
- Baked on neutral beige finish over galvalume steel for maximum

cabinet life. (Other finishes are available.)

Ease of Service

- Service access valves are standard.
- Standard 2" (50 mm) pleated filter with a MERV rating of 7 changeable from outside.
- All major components are readily accessible.
- Front Control Panel allows easy access and complies with NEC clearance codes on redundant side-by-side systems.
- LEDs indicate operational status and fault conditions.

A Marvair® First – Factory Installed Economizer

Marvair's ComPac® II air conditioner has been the industry standard since its introduction in 1986. Tens of thousands of ComPac II air conditioners are in operation from the metropolitan areas of North America to the deserts of the Mid-East to the Siberian tundra. Here's how the economizer works:

On a signal from the wall mounted indoor thermostat that cooling is required, either mechanical cooling with the compressor or free cooling with the economizer is provided. A factory installed enthalpy controller determines whether the outside air is sufficiently cool and dry to be used for cooling. If suitable, the compressor is locked out and the economizer damper opens to bring in outside air. Integral pressure relief allows the interior air to exit the shelter, permitting outside air to enter the shelter. The temperature at which the economizer opens is adjustable from 52°F (12°C) at 50% Relative Humidity to 78°F (26°C) at 50% Relative Humidity.

After the enthalpy control has activated and outside air is being brought into the building, the mixed air sensor measures the temperature of the air entering the indoor blower and then modulates the economizer damper to mix the right proportion of cool outside air with warm indoor air to maintain 50-56°F (10 - 13°C) air being delivered to the building. This prevents shocking the electronic components with cold outside air. The compressor is not permitted to operate when the economizer is functioning.

If the outside air becomes too hot or humid, the economizer damper closes completely, or to a minimum open position with an optional minimum position potentiometer, and mechanical cooling is activated.

Unlike other economizers, the Marvair 100% economizer cycle provides the same quantity of outside air (CFM) as is provided in mechanical cooling (compressor operation). The 100% economizer increases the savings by taking full advantage of using outside air to cool the shelter.

Controllers and Thermostats

Controllers

CommStat 4 Telecom HVAC Controller

P/N S/7846

The CommStat 4 HVAC controller is designed specifically for controlling two redundant air conditioners, heat pumps or air conditioners with 2-stage compressors in a telecommunication shelter. The CommStat 4 has seven outputs for remote alarms or notification. Status LED's indicate HEAT, COOL, POWER and the LEAD unit. When a fault is detected, an alarm LED flashes and the LCD screen displays the fault.

The CommStat 4 uses RS-485 communications via a RJ11 jack. It is capable of interfacing with a secondary control board which can interpret Marvair's communication protocol and provide Internet capability. (Note: the end user must provide the interface board and the Graphical User Interface (GUI) software to gain access via the Internet). It can be daisy chained with a second CommStat 4 controllers for controlling up to four air conditioners in one shelter. When two CommStat 4 controllers are daisy chained together, one is the MASTER and the other controller is the SLAVE. Any settings to the MASTER unit immediately take effect on the SLAVE unit. See the CommStat 4 Product Data Sheet for complete details.

CommStat3™ Lead/Lag Microprocessor Controller

P/N S/04581

Solid state controller designed to operate a fully or partially redundant air conditioning system. Insures equal wear on both air conditioners while allowing the lag unit to assist upon demand. Lead/lag changeover is factory set at 7 days, but is field programmable in 1/2 day increments from 1/2 to 7 days. The CommStat 3™ Controller has LED's to indicate status & function, digital display of temperature, a comfort override button for energy

savings, five alarm relays, a built in temperature sensor and is fully programmable. See CommStat 3™ Controller Product Data Sheet for details on operation & installation.

LL357D4 Lead/Lag Controller

Two stage heat and cool thermostat with solid state module for redundant operation. (See the LL357D4 Product Data Sheet for details.)

Thermostats & Thermostat Guards

Note: All air conditioners with 2-stage compressors, models HVEA, require a 2 stage cooling thermostat.

Thermostat P/N 50123

Digital thermostat. 1 stage heat, 1 stage cool. 7 day programmable. Fan switch: Auto & On. Auto-change over. Keypad lockout. Non-volatile program memory.

Thermostat P/N 50107

Digital thermostat. 2 stage heat, 2 stage cool. 7 day programmable. Fan switch: Auto & On. Auto-change over. Status LED's. Backlit display. Programmable fan. Non-volatile program memory.

Thermostat Guard P/N 50092

Thermostat guard for use with the 50123 and 50107 thermostats.

Thermostat P/N 50186

Digital, non-programmable thermostat. 1 stage cool and 1 stage heat. Auto-changeover.

Digital Humidistat P/N 50254

To be used with units with hot gas or electric reheat. Programmable dehumidistat and ventilation controller. Time of day can be set for dehumidifier or ventilation to run. Permanent memory retention of set points. Humidity sensor can be field calibrated. High & low dehumidification set points. Outdoor temperature and humidity sensor included. °F or °C selectable.

Accessories

Supply Grilles

For AVPA20/24

20" x 8" (508 mm x 203 mm) P/N 80674

For AVPA30,36 and HVEA24

28" x 8" (711 mm x 203 mm) P/N 80675

For AVPA42,48,60,72 and HVEA30, 36, 42, 49, 60

30" x 10" (762 mm x 254 mm) P/N 80676

Return Grilles

For AVPA20/24

20" x 12" (508 mm x 305 mm) P/N 80677

For AVPA30,36 and HVEA24

28" x 14" (711 mm x 356 mm) P/N 80678

For AVPA42,48,60,72 and HVEA30, 36, 42, 49, 60

30" x 16" (762 mm x 406 mm) P/N 80679

Return Filter Grilles

Used when filter must be changed from the interior.

Not recommended for ComPac® II air conditioner.

Note: Filter used in Return Filter Grille is 1" (25 mm) thick.

For AVPA20/24

20" x 12" (508 mm x 305 mm) P/N 80671

For AVPA30,36 and HVEA24

28" x 14" (711 mm x 356 mm) P/N 80672

For AVPA42,48,60,72 and HVEA30, 36, 42, 49, 60

30" x 16" (762 mm x 406 mm) P/N 80673

Model Identification

● VP	S	A	●	AC	●	●	●
A = Air Source Vertical Package H = High Efficiency Vertical Package	2-Stage Compressor	Refrigerant A = R410A	Nominal Cooling 24 = 24,000 BTUH 30 = 30,000 BTUH 36 = 36,000 BTUH 42 = 42,000 BTUH 48/49 = 48,000 BTUH 60 = 60,000 BTUH 72 = 72,000 BTUH	System Type Air Conditioner	Power Supply A = 208/230V, 1ø, 60Hz C = 208/230V, 3ø, 60Hz D = 460V, 3ø, 60Hz	Configuration N = ComPac® I A/C C = ComPac® II A/C	Special Option Code R = Electric Reheat U = Scroll Comp.
Electric Heat – kW							000 = No Heat 090 = 9 kW 040 = 4 kW 100 = 10 kW 050 = 5 kW 150 = 15 kW 080 = 8 kW

Certified Efficiency and Capacity Ratings at ANSI/AHRI Standard 390 - AVPA Air Conditioners



Model Number	AVPA24			AVPA30			AVPA36			AVPA42			AVPA48			AVPA60			AVPA72		
	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD
Cooling BTUH ¹	24,000			29,000			35,000			42,000			46,500			54,500			62,000		
EER ²	9.25			9.25			9.25			9.25			9.50			9.25			10.00		
Rated Air Flow (CFM ³)	840			1,000			1,220			1,575			1,760			1,850			2,050		
ESP ⁴ @ Rated Conditions	0.10			0.15			0.15			0.15			0.20			0.20			0.20		

¹Cooling rated at 95°F (35°C) outdoor and 80°F DB/67° WB (26.5°C DB/19.5°C WB) return air. ²EER=Energy Efficiency Ratio

³CFM=Cubic Feet per Minute ⁴ESP=External Static Pressure

Ratings are with no outside air. Performance will be affected by altitude.

Ratings are at 230 volts for 208/230 volt units ("A" & "C" models) and 460 volts for "D" models. Operation of units at a different voltage from that of the rating point will affect performance and air flow.

Sensible Total Heat Ratio @ 95°F (35°C) Outside Air Dry Bulb - AVPA Air Conditioners

Model Number	AVPA24			AVPA30			AVPA36			AVPA42			AVPA48			AVPA60			AVPA72		
	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD
Total Capacity	24,000			29,000			35,000			42,000			46,500			54,500			62,000		
Sensible Heat Ratio	0.71			0.75			0.69			0.75			0.76			0.72			0.71		
Sensible Capacity	16,950			21,740			24,155			31,640			35,125			39,000			43,815		
Rated Air Flow (CFM ¹)	840			1,000			1,220			1,575			1,760			1,850			2,050		

¹CFM=Cubic Feet per Minute. Sensible heat ratios based upon ANSI/AHRI std. 390 outdoor air conditions of 95°F (35°C) and 80°F DB/67° WB (26.5°C DB/19.5°C WB) return air.

Cooling Performance (BTUH) at Various Outdoor Temperatures - AVPA Air Conditioners

Model Number	Outdoor Temperature									
	75°F / 24°C	80°F / 26.5°C	85°F / 29°C	90°F / 32°C	95°F / 35°C	100°F / 38°C	105°F / 40.5°C	110°F / 43.3°C	115°F / 46°C	
AVPA24AC	27,840	26,880	25,920	24,960	24,000	23,040	22,080	21,120	20,640	
AVPA30AC	33,600	32,480	31,320	30,160	29,000	27,840	26,680	25,520	24,940	
AVPA36AC	40,600	39,200	37,800	36,400	35,000	33,600	32,200	30,800	30,100	
AVPA42AC	48,720	47,040	45,360	43,680	42,000	40,320	38,640	36,960	36,120	
AVPA48AC	53,940	52,080	50,220	48,360	46,500	44,640	42,780	40,920	39,900	
AVPA60AC	63,220	61,040	58,860	56,680	54,500	52,320	50,140	47,960	46,870	
AVPA72ACA	71,920	69,440	66,960	64,480	62,000	59,520	57,040	54,560	53,320	
AVPA72ACC, ACD	81,200	78,400	75,600	72,800	70,000	67,200	64,400	61,600	60,200	

Based upon ANSI/AHRI std. 390 return air conditions of 80°F DB/67° WB (26.5°C DB/19.5°C WB) at various outdoor temperatures.

Certified Efficiency and Capacity Ratings at ANSI /AHRI Standard 390 for HVESA Air Conditioners with 2-Stage Compressors



Model Number	HVESA36			HVESA42			HVESA49			HVESA60		
	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD
Cooling BTUH ¹ - 2nd Stage		35,000			39,000			47,000			56,000	
EER ² - 2nd Stage		11.00			10.50			11.75			10.50	
Integrated Part Load Value ³		16.0			14.1			16.0			14.8	
Rated Air Flow (CFM ⁴)		1,300			1,400			1,750			1,900	
ESP ⁵ @ Rated Conditions		0.15			0.15			0.20			0.20	

¹Cooling rated at 95°F (35°C) outdoor and 80°F DB/67° WB (26.5°C DB/19.5°C WB) return air. ²EER=Energy Efficiency Ratio
³Integrated Part Load Value is an integrated efficiency measure from 1st and 2nd stage capacity modulation.
⁴CFM=Cubic Feet per Minute ⁵ESP=External Static Pressure
Ratings are with no outside air. Performance will be affected by altitude.
Ratings are at 230 volts for 208/230 volt units ("A" & "C" models) and 460 volts for "D" models. Operation of units at a different voltage from that of the rating point will affect performance and air flow.

Sensible Total Heat Ratio @ 95°F (35°C) Outside Air Dry Bulb - HVESA Air Conditioners with 2-Stage Compressors

Model Number	HVESA36			HVESA42			HVESA49			HVESA60		
	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD	ACA	ACC	ACD
Total Capacity		35,000			39,000			47,000			56,000	
Sensible Heat Ratio		0.70			0.71			0.79			0.77	
Sensible Capacity		24,445			27,590			36,920			43,235	
Rated Air Flow (CFM ¹)		1,300			1,400			1,750			1,900	

¹CFM=Cubic Feet per Minute
Sensible heat ratios based upon ANSI/AHRI std. 390 outdoor air conditions of 95°F (35°C) and 80°F DB/67° WB (26.5°C DB/19.5°C WB) return air.

Stage 2 Cooling Performance (BTUH) at Various Outdoor Temperatures

Model Number	Outdoor Temperature				
	75°F / 24°C	80°F / 26.5°C	85°F / 29°C	90°F / 32°C	95°F / 35°C
HVESA36AC	40,600	39,200	37,800	36,400	35,000
HVESA42AC	45,240	43,680	42,120	40,560	39,000
HVESA49AC	54,520	52,640	50,760	48,880	47,000
HVESA60AC	64,960	62,720	60,480	58,240	56,000

Based upon ANSI/AHRI std. 390 return air conditions of 80°F DB/67° WB (26.5°C DB/19.5°C WB) at various outdoor temperatures.

Stage 1 Cooling Performance (BTUH) at Various Outdoor Temperatures

Model Number	Outdoor Temperature				
	75°F / 24°C	80°F / 26.5°C	85°F / 29°C	90°F / 32°C	95°F / 35°C
HVESA36AC	30,856	29,792	28,728	27,664	26,600
HVESA42AC	34,336	33,152	31,968	30,784	29,600
HVESA49AC	44,080	42,560	41,040	39,520	38,000
HVESA60AC	51,040	49,280	47,520	45,760	44,000

Based upon ANSI/AHRI std. 390 return air conditions of 80°F DB/67° WB (26.5°C DB/19.5°C WB) at various outdoor temperatures.

Electrical Characteristics - Compressor, Fan & Blower Motors - HVESA Air Conditioner with 2-Stage Compressor

BASIC MODEL	Type	COMPRESSOR			OUTDOOR FAN MOTOR				INDOOR FAN MOTOR (ECM ⁶)			
		VOLTS-HZ-PH	RLA ¹	LRA ²	VOLTS-HZ-PH	RPM ³	FLA ⁴	HP ⁵	VOLTS-HZ-PH	RPM ³	FLA ⁴	HP ⁵
HVESA36ACA	SCROLL	208/230-60-1	16.6	82.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA42ACA		208/230-60-1	16.6	96.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA49ACA		208/230-60-1	21.1	96.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA60ACA		208/230-60-1	25.6	118.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA36ACC	SCROLL	208/230-60-3	11.1	58.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA42ACC		208/230-60-3	13.4	88.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA49ACC		208/230-60-3	13.4	88.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA60ACC		208/230-60-3	17.6	123.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA36ACD	SCROLL	460-60-3	4.5	29.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA42ACD		460-60-3	6.1	44.0	208/230-60-1	825	2.8	1/3	208/230-60-1	1500	2.8	1/2
HVESA49ACD		460-60-3	6.4	41.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4
HVESA60ACD		460-60-3	9.0	62.0	208/230-60-1	825	2.8	1/2	208/230-60-1	1500	4.3	3/4

¹RLA = Rated Load Amps ²LRA = Locked Rotor Amps ³RPM = Revolutions per Minute ⁴FLA = Full Load Amps ⁵HP = Horsepower ⁶ECM = Electronically Commutated Motor
The 460 volt units have a step down transformer for the 230 volt motors.

Summary Electrical Ratings (Wire Sizing) - HVESA Air Conditioner with 2-Stage Compressor Manual Damper ("N") or Economizer ("C")

ELECTRIC HEAT		000 = None		040 = 4 kw		050 = 5 kw		060 = 6 kw		080 = 8 kw		090 = 9 kw		100 = 10 kw		120 = 12 kw				150 = 15 kw					
BASIC MODEL	VOLTAGE PHASE	CKT #1		CKT #1		CKT #1		CKT #1		CKT #1		CKT #1		CKT #1		CKT #1		CKT #1		CKT #2		CKT #1		CKT #2	
		MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²	MCA ¹	MFS ²
HVESA36ACA	208-230/1	26.4	40	26.4	40	28.8	40	34.1	40	44.4	45	n/a	n/a	54.9	60	26.4	40	41.6	45	28.8	40	52.1	60		
HVESA42ACA	208-230/1	26.4	40	n/a	n/a	28.8	40	n/a	n/a	n/a	n/a	n/a	n/a	54.9	60	26.4	40	41.6	45	28.8	40	52.1	60		
HVESA49ACA	208-230/1	33.5	50	n/a	n/a	33.5	50	n/a	n/a	n/a	n/a	n/a	n/a	56.4	60	33.5	50	41.6	45	33.5	50	52.1	60		
HVESA60ACA	208-230/1	39.4	60	n/a	n/a	39.4	60	n/a	n/a	n/a	n/a	n/a	n/a	56.4	60	39.4	60	41.6	45	39.4	60	52.1	60		
HVESA36ACC	208-230/3	19.5	25	n/a	n/a	n/a	n/a	20.8	25	n/a	n/a	29.9	30	n/a	n/a	38.9	40	n/a	n/a	47.9	50	n/a	n/a		
HVESA42ACC	208-230/3	22.4	30	n/a	n/a	n/a	n/a	22.4	30	n/a	n/a	29.9	30	n/a	n/a	38.9	40	n/a	n/a	47.9	50	n/a	n/a		
HVESA49ACC	208-230/3	23.9	35	n/a	n/a	n/a	n/a	23.9	35	n/a	n/a	31.4	35	n/a	n/a	40.4	45	n/a	n/a	49.4	50	n/a	n/a		
HVESA60ACC	208-230/3	29.4	45	n/a	n/a	n/a	n/a	30.0	45	n/a	n/a	31.4	45	n/a	n/a	40.4	45	n/a	n/a	49.4	50	n/a	n/a		
HVESA36ACD	460/3	8.4	15	n/a	n/a	n/a	n/a	10.4	15	n/a	n/a	14.9	15	n/a	n/a	19.4	20	n/a	n/a	23.9	25	n/a	n/a		
HVESA42ACD	460/3	10.4	15	n/a	n/a	n/a	n/a	10.4	15	n/a	n/a	14.9	15	n/a	n/a	19.4	20	n/a	n/a	23.9	25	n/a	n/a		
HVESA49ACD	460/3	11.6	15	n/a	n/a	n/a	n/a	11.6	15	n/a	n/a	15.7	20	n/a	n/a	20.2	25	n/a	n/a	24.7	25	n/a	n/a		
HVESA60ACD	460/3	14.8	20	n/a	n/a	n/a	n/a	14.8	20	n/a	n/a	15.7	20	n/a	n/a	20.2	25	n/a	n/a	24.7	25	n/a	n/a		

¹MCA = Minimum Circuit Ampacity (Wiring Size Amps)

²MFS = Maximum Fuse Size or HACR breaker

This chart should only be used as a guideline for estimating conductor size and overcurrent protection. Always refer to the data label on the unit for the requirements of the specific unit. MCA & MFS are calculated at 230v. for the 208-230v units (A & C models) and at 460 volt for the 460v. units (D models).

All 460 units will have a step down transformer for the 230 volts motors.

DIMENSIONS - AVPA42-60, and HVEA30-42, HVESA30-42

SHIP WEIGHT (LBS/KG)

FILTER SIZE

MODEL	AVPA4248/60	HVEAHVES430/36/42
FILTER SIZE (IN)	22 x 36-1/2 x 2	22 x 36-1/2 x 2
FILTER SIZE (MM)	559 x 927 x 51	559 x 927 x 51

CommStat 4™ Telecom HVAC Controller

The CommStat 4 is an HVAC controller designed specifically for controlling two redundant air conditioners, heat pumps and air conditioners with two stage compressors in a telecommunications shelter or enclosure. In addition to the control of the air conditioners or heat pumps, the CommStat 4 has seven outputs for remote alarms or notification. The CommStat 4 uses RS-485 communications via a RJ11 communication jack. It is capable of interfacing with a secondary control board which can interpret Marvair's communication protocol and provide Internet connectivity. **Note: the end user must provide the interface board and the Graphical User Interface (GUI) software to gain access via the Internet.**

The CommStat 4 is factory programmed with standard industry set points, but can be configured on site. Settings are retained indefinitely in the event of a power loss.



CONTROL UP TO FOUR AIR CONDITIONERS OR HEAT PUMPS IN A SHELTER

The CommStat 4 has the capability to be daisy chained with up a second CommStat 4 controller for controlling up to four air conditioners or heat pumps in a shelter. When two CommStat 4 controllers are daisy chained together, one of the controllers is the Master and controls the second CommStat 4 controller. Any settings to the Master unit immediately take effect on the Slave unit. The interface for the daisy chain is an RJ11 connector.

EASE OF CONTROL AND CONFIGURATION

A large, backlit LCD display shows the status of the system and provides a convenient user interface. Status LEDs indicate Heat, Cool, Power and the Lead Unit. When a fault is detected, an alarm LED flashes and the LCD screen displays the fault. If multiple faults are detected, the display will scroll the faults across the screen.

The CommStat 4 is easily configured with four buttons. A Comfort button changes the temperature in the shelter for 90 minutes. After 90 minutes, the temperature reverts back to the programmed set points. A lead swap button alternates the lead and lag unit, allowing service techs to quickly check the operation of each unit.

For security, the keypad can be locked out to prevent unwanted changes to the set points. English, Spanish or French is selectable as the language shown on the display. °F or °C is selectable.

RoHS COMPLIANT

The CommStat 4 controller contains no hazardous materials and is RoHS compliant.

Specification/Features

Thermostat

- Cooling Set Point: 65°F through 95°F (18°C through 35°C) in 1° increments.
- Heating Set Point: 50°F through 80°F (10°C through 27°C) in 1° increments.

Differential

- All stages ON differential: 2°F through 5°F (1° through 3°C) in 1° increments.
- All stages OFF differential: 1°F through 5°F (1° through 3°C) in 1° increments. The 2nd stage differential is referenced to the 1st stage differential and the outputs will stage off as each stage's differential is satisfied.
- Changeover Differential between cooling and heating: Minimum of 3°F (2°C).
- 3rd stage heating Differential: 0°F through 7°F (0°C through 4°C) in 1° increments

Control Voltage

- The CommStat 4 is powered by a nominal 24 VAC or with a user provided 24 VDC or 48 VDC power supply. Should AC power be lost, the display, user interface and the alarm outputs remain functional. System outputs (Y, G, W, O and the Mixed Air Relay) will not be functional when 24 VAC is not present. If the control voltage is not present, the Low Voltage Loss alarm relay is energized.

Operating Range: -40°F through 150°F (-40°C through 66°C)

Minimum Voltage: 18 VAC

Maximum Voltage: 30 VAC

Ease of Installation

- Wiring connection insensitive to phasing of the units.
- Easy terminal connections for thermostat wire.
- Remote temperature sensors insure accurate temperature readings in the shelter.
- Easy attachment to the wall.

Lead/Lag Operation

- User selectable changeover from ½ to 7 days in ½ day increments. If the lead unit loses power, the lag unit automatically becomes the lead unit with all the set points of the lead unit. A lead swap button alternates the lead and lag unit, allowing service techs to easily check the operation of each unit.

Alarms

Dry contacts can be used for remote alarm or notification. Relays can be wired Normally Open (NO) or Normally Closed (NC). Most alarm relays can be reset by turning the CommStat 4 OFF and then ON OR the UP and DOWN buttons are held simultaneously for 4 seconds. Alarms can be reset provided

there is no longer an input from the smoke detector. All alarms are functional when 24 VAC is applied to the board. If 24 VAC is not present, no alarms will be displayed unless DC power is present. If DC power is supplied to the board, the display is operational.

- High (Line) Voltage - activated if line voltage is not present. The CommStat 4 requires a line voltage of 230VAC input from each air conditioner or heat pump to monitor for the presence of line voltage. If line voltage is not present, the High Voltage Loss alarm relay is energized. If desired, this alarm can be disabled by the user in Configuration Set up.
- Low (Control) Voltage – activated if control voltage is not present.
- Lockout – activated if any air conditioner or heat pump is off due to either high or low refrigerant pressure lockout. If all the air conditioners or heat pumps are locked out, the Mixed Air Relay (MAR) will be activated on each of the air conditioners or heat pumps. This air conditioner or heat pump will go into the Ventilation mode, provided there is a call for cooling. If desired, the lockout alarm can be disabled by the user in the Configuration Set-up.
- Low Building Temperature Alarm – Activated if the temperature in the building drops to the selected temperature. If the low building temperature alarm is activated, the LCD displays, "Low Building Temperature".
- First Stage High Building Temperature Warning – If the set point temperature is reached, the display will show, "First Stage High Building Temperature" on the LCD display.
- Second Stage High Building Temperature Alarm- If the set point temperature is reached, the display will show, "Second Stage High Building Temperature" on the LCD display and all outputs are turned off with the exception of the Mixed Air Relay (MAR) and the Air Mover Relay (AMR). If the air conditioner(s) or heat pump(s) on the shelter have economizer(s), the economizer(s) will open, and the indoor blower(s) will be energized (Emergency Ventilation Mode).
- Smoke Alarm – the contacts will be energized when the smoke detector inputs receive a signal from an external detector. All air conditioners or heat pumps are immediately shut down. A physical reset is required to clear the alarm in the manual mode. If auto reset has been selected, the alarm will reset after the user specified time (3-10 minutes).
- AUX1 and AUX2 – Two auxiliary dry contact outputs that can be energized based upon AUX1 and AUX2 inputs.

CommStat 4 Lead/Lag Controller Inputs

1. Input Power

The R and C terminals are the input power terminals for each respective air conditioner or heat pump.

2. Modem Connection

The modem connection is used for remote communication and remote programming of the CommStat 4. It has the capability of providing shelter temperatures, mode of operation, as well as remote diagnosis. All configuration settings can be viewed and changed remotely.

3. Control Voltage (24 VAC)

The CommStat 4 is powered by 24 VAC or with a user provided 24 VDC or 48 VDC power supply. Should AC power be lost, the display, user interface and alarm outputs of the CommStat 4 will still be functional. However, the system outputs of the CommStat 4 (Y, G, W, O, and MAR) will not be functional when 24 VAC is not present.

4. Line Voltage

The CommStat 4 uses line voltage of 230VAC input from each unit air conditioner to monitor for the presence of line voltage. If a line voltage loss is not present, the CommStat 4 will energize the High Voltage Loss Alarm relay. If desired, this alarm can be disabled by the user in Configuration Set Up.

5. Temperature Sensors

The CommStat 4 uses remote temperature sensor(s) to measure the temperature in the shelter and determine when the system is calling for heating or cooling. Up to three sensors can be connected to each CommStat 4. There are two options for the sensors. If **No** (the default setting) is selected and multiple sensors are being used, the temperatures will be averaged. If **Yes** is selected and multiple sensors are being used, the sensor with the highest reading will be used for cooling operation and the one with the lowest reading will be used for heating. When multiple sensors are being used and there is a temperature differential greater than or equal to 5°F (4°C) between the sensors, the CommStat 4 lead/lag controller will energize the indoor blowers (G) on all connected units.

Screen #20 in the Configuration Mode allows the user to determine how the temperature sensors will be configured.

6. Smoke Detector

The smoke detector input terminals determine when there is a signal from an external smoke detector. They can be configured for either a **Normally Open** (N.O.) or **Normally Closed** (N.C.) smoke signal in Configuration screen # 18. During a smoke fault condition, all AC units will be turned off.

The smoke alarm relay reset has two selections -**Manual** (default) and **Auto**. If **Manual** is selected, a physical reset of the fault is required by holding the Up and Down buttons for 4 seconds. Cycling power will not reset a smoke fault if **Manual** is selected.

If **Auto** is selected the alarm will reset after an adjustable time delay of 3-10 minutes.

Screen #17 in the Configuration Mode allows the user to determine how the smoke alarm relay reset will be configured.

7. Hydrogen Detector

The hydrogen detector input terminals will determine when there is a 24 VAC signal from an external hydrogen detector. The CommStat 4 will switch the lead unit to Emergency Ventilation mode (ComPac II air conditioners or Classic heat pumps with economizers only) when high hydrogen levels are detected. It will switch back to normal air conditioning mode once the hydrogen levels are acceptable and the 24 VAC signal is removed from the hydrogen detector input terminals.

8. Generator Relay

The generator input will monitor for a 24 VAC signal which will be used to determine when the CommStat 4 is operating on generator power. When 24 VAC is recognized at the generator relay input, the CommStat 4 controller will only operate the units selected by the user in screen # 16 of the Configuration Menu. The options are:

- a. to run only the lead unit (default),
- b. the lead unit and one lag unit,
- c. the lead unit and two lag units, or
- d. the lead unit and three lag units.

9. Economizer Mode Status Monitoring

The 2 terminal in the air conditioner is monitored for a 24 VAC signal. When the 2 terminal has 24 VAC present, mechanical cooling will be energized and the cooling LED will be lit. When 24 VAC is not present at the 2 terminal, the unit will be in economizer mode and this status will be annunciated on the LCD display. Economizer mode is defined as a call for cooling (24VAC output at Y and O) with no 24VAC signal at the 2 terminal. Mechanical cooling is defined as a call for cooling (24VAC output at Y and O) while there is a 24VAC signal at the 2 terminal.

CommStat 4 Lead/Lag Controller Inputs (cont'd)

10. Lockout Relay (LOR)

The CommStat 4 has a lockout relay input (LOR) and will provide a Normally Open (NO) or Normally Closed (NC) output in accordance to this input. This feature is enabled in the Configuration Mode, screen #10 by either selecting **On** (default) or **Off**. If **On** is selected, the control will turn the output off, energize the lockout relay output (NO or NC), and annunciate which unit is locked out on the LCD display. If all the units are locked out, the mixed air relay will be activated on each unit to provide emergency ventilation, provided there is a call for cooling.

Cycling power will not reset the Lockout fault. A physical reset of the fault will be required by pressing the Up and Down buttons for 4 seconds.

11. AUX1-IN/AUX2

The CommStat 4 has the option for two, dry contact, auxiliary outputs that will energize based on the AUX1 and AUX2 inputs. Each AUX input can be configured to look for a normally open (NO) or normally closed (NC) signal in Configuration Mode, screens # 21 and # 22. Each screen will allow the user the option of **NO**, **NC**, or **OFF** to disable the feature. Note: AUX1 and AUX2 are not available when the Economizer configuration 2 is selected in screen 19.

AUX1 and AUX2 are independent from the operation of the board and the air conditioners or heat pumps.

CommStat 4 Lead/Lag Controller Outputs

(refer to the Thermostat and Line Voltage Connection Schematic on page 6)

1. Y or 1

The Y or 1 output energizes the compressor when the economizer is not selected. Upon a call for cooling, the Y (1) and O terminals are energized. On a call for 1st stage heating, the Y(1) output will be energized. There is a minimum compressor time off delay of 3 minutes for the lead unit and 4 minutes for the lag unit. A minimum compressor run time is preset at three minutes by the controller.

2. G or 3

The G or 3 output terminal energizes the indoor fan during either heating or cooling.

3. W or 4

The W or 4 output terminal energizes the electric heat.

4. O (Heat Pumps) or Y2 (Air Conditioners with 2 Stage Compressors)

The O output terminal energizes the reversing valve on heat pumps. The valve is energized on a call for cooling. If staged air conditioners are selected in Configuration screen #25, the O output becomes the second stage cooling output, Y2.

5. Lockout Alarm

When enabled in screen #10 of the Configuration Menu, the CommStat 4 monitors the Lockout Relay (LOR) input for a contact closure. If there is a contact closure between the LOR terminals, the control will turn off all outputs, energize the NO or NC contacts, and display which unit is locked out on the LCD display. The default setting in the configuration is "On". If all of the connected units are locked out, the Mixed Air Relay (MAR) will be activated on each of the connected units and the units will go into Emergency Ventilation mode. Cycling power will reset the Lockout Alarm.

6. Low (Control) Voltage Loss Alarm

The low voltage loss alarm relay provides a dry contact closure if control voltage is not present.

7. High (Line) Voltage Loss Alarm

The high voltage loss alarm relay will provide a dry contact closure if line voltage is not present.

8. Low Building Temperature Alarm

The Low Building Temperature Alarm has an adjustable temperature range of 30°F thru 65°F (-1°C thru 19°C) that may be adjusted in screen #8 of the configuration menu. If the temperature drops to this setting, all outputs will be turned off and the LCD display will annunciate Low Building Temperature. There is a 2°F (1°C) differential for this alarm to reset.

9. First Stage High Building Temperature Warning

The set point temperature is adjustable from 70°F thru 140°F (21°C thru 60°C). If this set point is reached, the control will display a First Stage High Building Temperature warning on the LCD display. The default setting for this is 85°F (29°C). There is a 2°F (1°C) differential for this alarm to reset. The first stage high temperature warning set point is adjustable in screen #6 of the Configuration Menu.

10. Second Stage High Building Temperature Alarm

This set point is adjustable from 75°F thru 145°F (24°C thru 63°C). If this set point is reached, all outputs are turned off with the exception of the Mixed Air Relay (MAR) and Air Mover Relay (AMR), and the control will display a Second Stage High Building Temperature alarm on the LCD display. The economizers (if air conditioners or heat pumps with economizers are installed) will run in the emergency mode and the indoor

CommStat 4 Lead/Lag Controller Outputs (cont'd)

blower will be energized with a DC inverter (if an inverter is present). There is a 2°F (1°C) differential for this alarm to reset. The temperature for the second stage high temperature alarm can be selected in screen #7 of the Configuration Menu.

11. Smoke alarm

The smoke alarm is energized when the smoke detector inputs sense a smoke fault condition. All outputs are off and the smoke alarm relay is energized during a smoke fault. This is a dry contact output that can be configured for NO or NC (default) operation in setting #18 of the configuration menu.

The smoke alarm has two selections - **Manual** (default) and **Auto**. If **Manual** is selected, a physical reset of the fault is required by holding the **Up** and **Down** buttons for 4 seconds. Cycling power will not reset a smoke fault if **Manual** is selected.

If **Auto** is selected the alarm will reset after an adjustable time delay of 3-10 minutes. Screen #17 in the Configuration Mode allows the user to determine how the smoke alarm relay reset will be configured.

12. Mixed Air Relay (MAR)

The MAR output is energized by the CommStat 4 when the second stage high temperature alarm has been activated. This is referred to as the Emergency Ventilation Mode.

13. DC Air Mover Relay (AMR)

The DC Air Mover Relay has a dry contact output and is energized in the Emergency Ventilation Mode.

14. AUX1 and AUX2

The CommStat 4 has the option for two, dry contact, auxiliary outputs that are energized based on the AUX1 and AUX2 inputs. Each AUX input can be configured to look for a normally open (NO) or normally closed (NC) signal in configuration screens #21 and #22. Each configuration screen allows the user the option of **NO**, **NC**, or **OFF** (default) to disable the feature. The AUX1 and AUX2 outputs provide a NO, NC, and COM terminal. Note: AUX1 and AUX2 are not available when the Economizer configuration 2 is selected in screen 19.

Important Safety Precautions

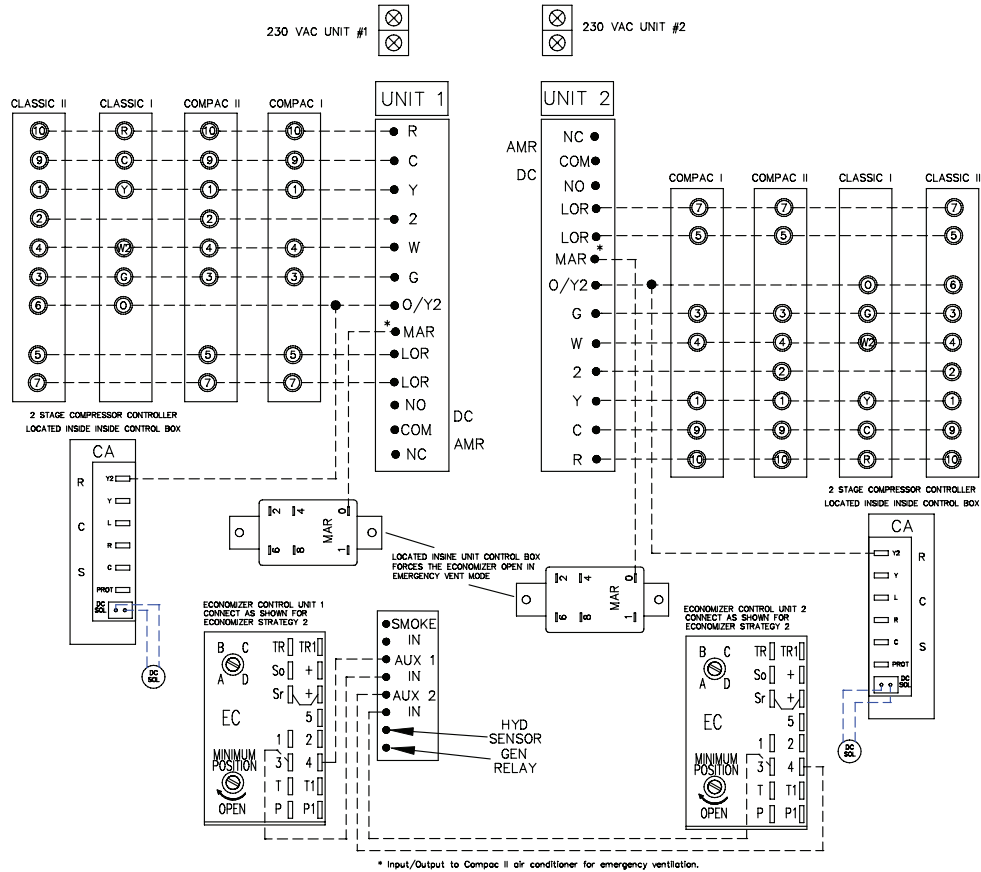


WARNING

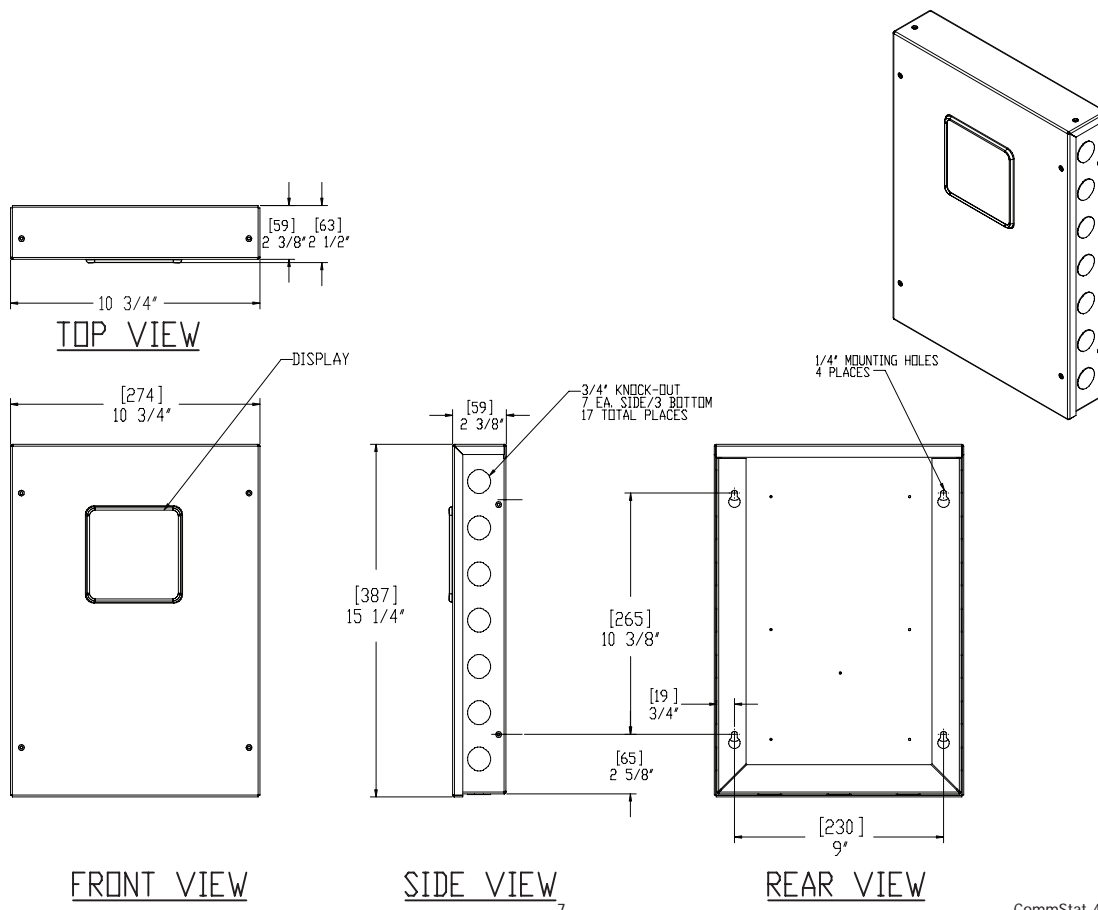
ALWAYS TURN OFF POWER AT THE MAIN POWER SUPPLY BEFORE INSTALLING, CLEANING, OR REMOVING THERMOSTAT.

- This thermostat is for 24 VAC applications only; do not use on voltages over 30 VAC
- Do not short across terminals of system control to test operation; this will damage your thermostat and may void your warranty
- All wiring must conform to local and national electrical and building codes
- Use this thermostat only as described in this manual

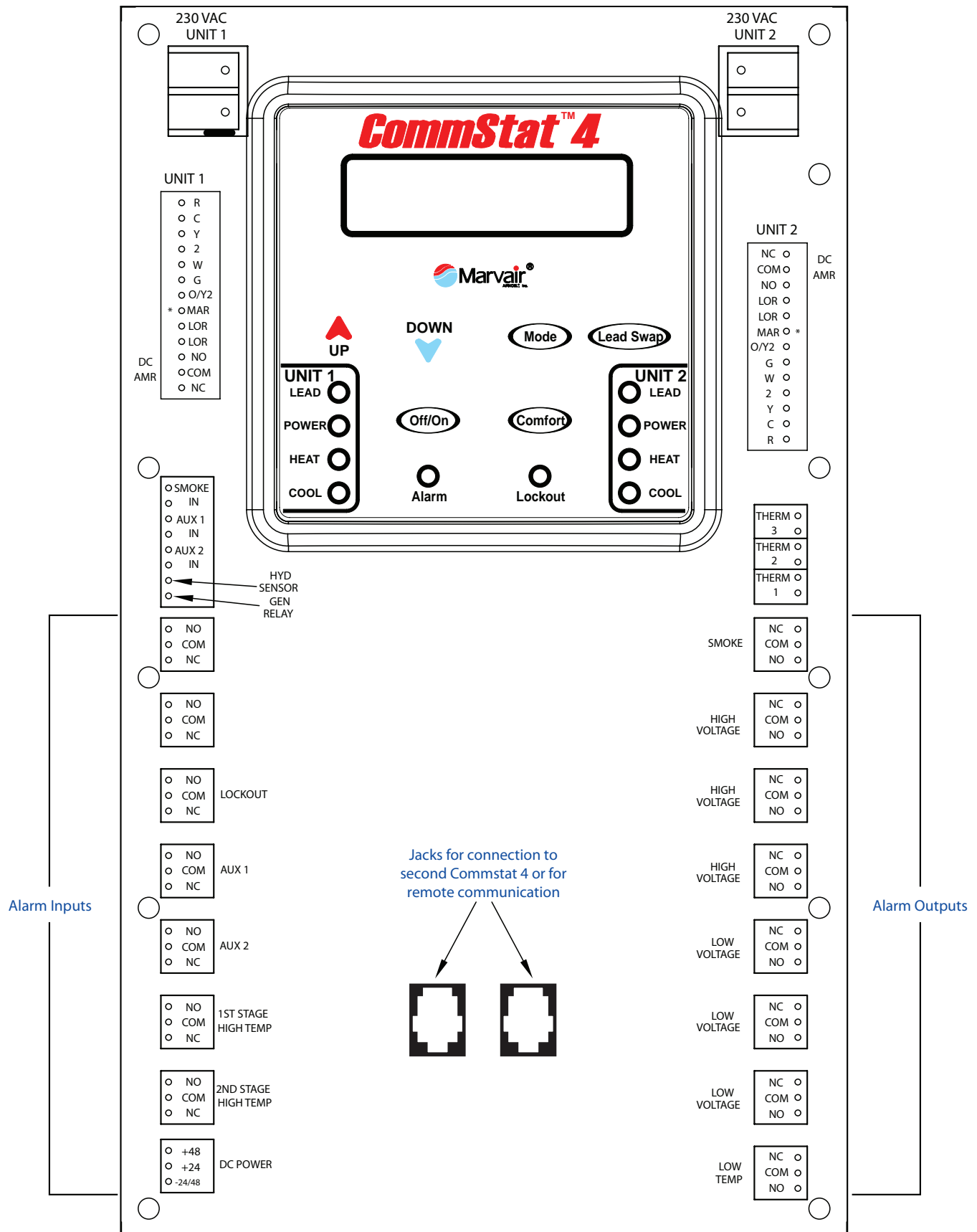
Thermostat and Line Voltage Connections Schematic



Dimensional Data



Alarm Connections Schematic



ELC6375DXD DRAINABLE COMBINATION LOUVER

MIAMI-DADE APPROVED

MIAMI-DADE COUNTY, FLORIDA NOTICE OF ACCEPTANCE NUMBER: 08.1211.05 (Expires 2/11/14)

Florida Product Approval #FL12232.1

STANDARD CONSTRUCTION

FRAME

6" (152) deep, 6063T5 extruded aluminum with .125" (3.2) nominal wall thickness. Downspouts and caulking surfaces provided.

BLADES

Front stationary drainable blades – 6063T5 extruded aluminum with .081" (2.1) nominal wall thickness, positioned at 37½° angle and spaced approximately 6⅛" (156) on center. Rear adjustable airfoil blades – 6063T5 extruded aluminum, .140" (3.6) nominal wall thickness.

SCREEN

5/8" x .040" (16 x 1) expanded, flattened aluminum bird screen in removable frame. Screen adds approximately ½" (13) to louver depth.

SEALS

Extruded vinyl blade edge seals on rear adjustable blades and flexible, compressible aluminum jamb seals.

LINKAGE

Concealed in frame.

BEARINGS

Stainless steel sleeve pressed into frame.

AXLES

½" (13) plated steel hex.

ACTUATOR

Locking louver quadrant.

FINISH

Mill.

MINIMUM SIZE

12"w x 12"h (305 x 305).

APPROXIMATE SHIPPING WEIGHT

8 lbs. per sq. ft. (39.1 kg per m²).

MAXIMUM SIZE

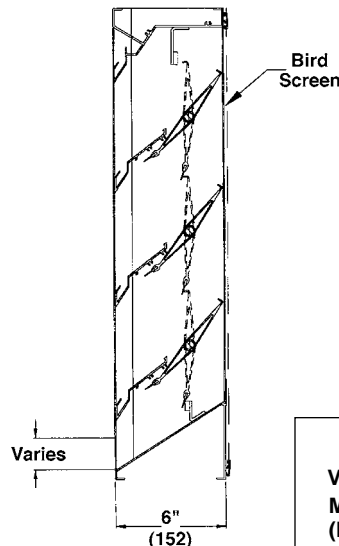
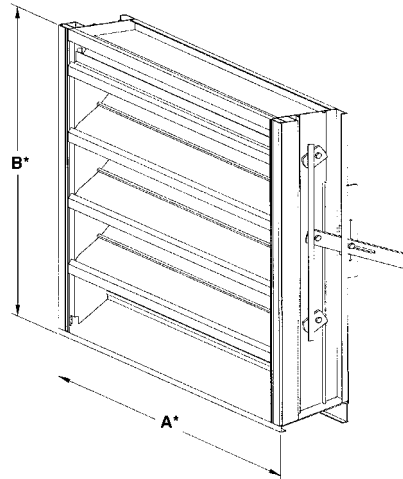
55"w x 120"h (1397 x 3048) factory assembly, unlimited width x 120"h field assembly. Louvers larger than the maximum factory assembly size will require field assembly of smaller sections.

INSTALLATION

The ELC6375DXD must be installed per the appropriate installation detail. Reference the appropriate separate installation instruction sheet.

MULLION SUPPORTS

Factory installed mullion supports are provided at rear of hidden mullions. Mullion depth = 1" (25) for louvers 75¾" (1924) tall and under. Depth = 5⅛" (130) for louvers over 75¾" (1924) tall.



FEATURES

- Approved for use in open structures with provisions to manage weather infiltration (wet rooms).
- Maximum windload ±110 PSF (5.27 kPa).
- 44% free area in 48" x 48" (1.2 x 1.2) size.
- Published performance ratings based on testing in accordance with AMCA Publication 511.
- Adjustable rear blades provide shut off when desired.
- Concealed blade linkage is protected from weather exposure and reduces required installation depth.
- Blade and jamb seals provide tight closure.
- High performance drainable frame and blade system collects and removes water providing excellent water penetration performance.

VARIATIONS

Variations to the basic design of the louver are available at additional cost. They include:

- Extended sill.
- Front or rear security bars.
- Filter racks.
- Installation angles.
- A variety of bird and insect screens.
- A selection of manual, electric, and pneumatic actuators.
- Selection of finishes: prime coat, baked enamel (modified fluoropolymer), epoxy, Pearledize, Kynar, clear and color anodize. (Some variation in anodize color consistency is possible).

Consult Ruskin for other special requirements.

LEED Material Information

VOC Content (g/L) - 0

Manufacturing Locations

(MR 5.1)

Geneva, AL 36340

Parsons, KS 67357

Recycled Content
(MR 4.1 & 4.2)

10% Post Consumer

30% Pre-Consumer

Dimensions in inches, parenthesis () indicate millimeters.

TAG	QTY.	SIZE		FRAME	VARIATIONS
		A*-WIDE	B*-HIGH		
PROJECT ARCH./ENGR. REPRESENTATIVE			LOCATION CONTRACTOR DATE		

MIAMI-DADE COUNTY HURRICANE STRUCTURAL TEST PERFORMANCE

SIZES TESTED: 165" w x 75³/₄" h (4391 x 1924) and 165" w x 120" h (4191 x 3048)

TAS 201-94 LARGE MISSILE IMPACT TEST

MISSILE TYPE	VELOCITY IN FT/SEC (M/SEC)	IMPACTS
9 lb (4kg) Southern Pine 2" x 4" (51 x 102)	50 (15.24)	6

TAS 202-94 UNIFORM STATIC AIR PRESSURE TEST (LOUVER ONLY)

LOAD IN PSF (kPA)	LOAD DURATION	LOUVER RECOVERY
+82.5 (+3.9)	30 seconds	100%
-82.5 (-3.9)	30 seconds	100%
+110.0 (+5.3)	30 seconds	100%
-110.0 (-5.3)	30 seconds	100%
+165.0 (+7.9)	30 seconds	100%
-165.0 (-7.9)	30 seconds	100%

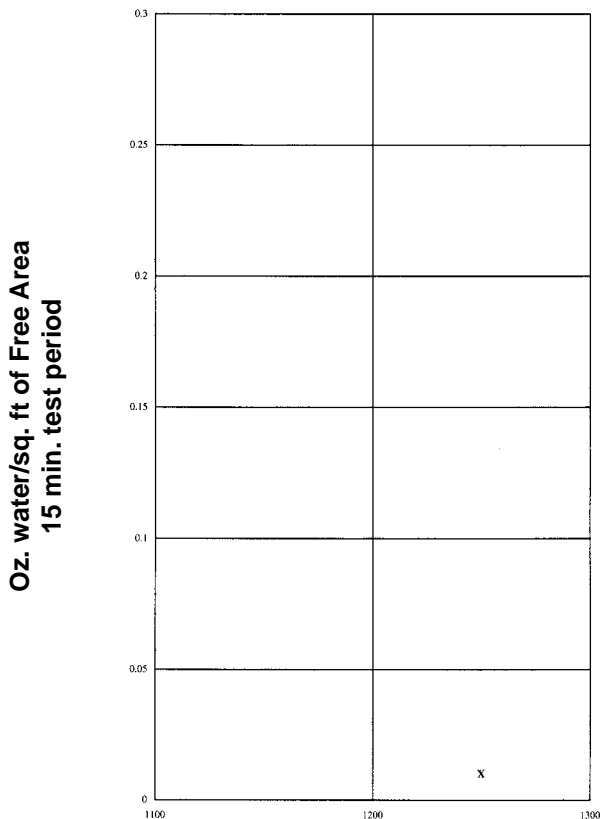
TAS 203-94 CYCLIC WIND PRESSURE TEST

CYCLES	LOAD IN PSF (kPA)	LOAD DURATION CYCLE	LOUVER RECOVERY
600	+55.0 (+2.6)	1 to 3 seconds	100%
600	-55.0 (-2.6)	1 to 3 seconds	100%
70	+66.0 (+3.2)	1 to 3 seconds	100%
70	-66.0 (-3.2)	1 to 3 seconds	100%
1	+143.0 (+6.8)	1 to 3 seconds	100%
1	-143.0 (-6.8)	1 to 3 seconds	100%

WATER PENETRATION

Test size 48" wide x 48" high (1219 x 1219)

Beginning point of water penetration at .01 oz./sq. ft. is above 1250 fpm (381 m/min).



Ruskin Company certifies that the ELC6375DXD louvers shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air performance rating and water penetration ratings only.

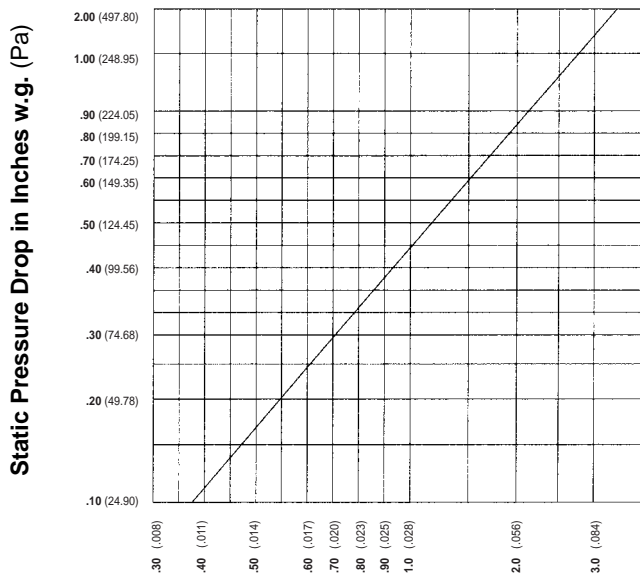
FREE AREA GUIDE

Free Area Guide shows free area in ft² and m² for various sizes of ELC6375DXD.
Width – Inches (Meters)

	12	18	24	30	36	42	48	55
	0.30	0.46	0.61	0.76	0.91	1.07	1.22	1.40
12	0.25	0.40	0.54	0.62	0.77	0.92	1.07	1.24
0.30	0.02	0.04	0.05	0.06	0.07	0.09	0.10	0.12
18	0.48	0.77	1.06	1.20	1.49	1.78	2.07	2.41
0.46	0.04	0.07	0.10	0.11	0.14	0.17	0.19	0.22
24	0.69	1.11	1.52	1.73	2.14	2.56	2.97	3.46
0.61	0.06	0.10	0.14	0.16	0.20	0.24	0.28	0.32
30	0.93	1.48	2.04	2.31	2.87	3.42	3.98	4.63
0.76	0.09	0.14	0.19	0.22	0.27	0.32	0.37	0.43
36	1.16	1.85	2.55	2.90	3.59	4.29	4.98	5.79
0.91	0.11	0.17	0.24	0.27	0.33	0.40	0.46	0.54
42	1.39	2.23	3.06	3.48	4.32	5.15	5.99	6.96
1.07	0.13	0.21	0.29	0.32	0.40	0.48	0.56	0.65
48	1.63	2.60	3.58	4.06	5.04	6.01	6.99	8.13
1.22	0.15	0.24	0.33	0.38	0.47	0.56	0.65	0.76
54	1.86	2.97	4.09	4.65	5.76	6.88	7.99	9.30
1.37	0.17	0.28	0.38	0.43	0.54	0.64	0.74	0.86
60	2.09	3.35	4.60	5.23	6.49	7.74	9.00	10.46
1.52	0.19	0.31	0.43	0.49	0.60	0.72	0.84	0.97
66	2.33	3.72	5.12	5.81	7.21	8.61	10.00	11.63
1.68	0.22	0.35	0.48	0.54	0.67	0.80	0.93	1.08
72	2.56	4.09	5.63	6.40	7.93	9.47	11.01	12.80
1.83	0.24	0.38	0.52	0.60	0.74	0.88	1.02	1.19
78	2.79	4.47	6.14	6.98	8.66	10.33	12.01	13.96
1.98	0.26	0.42	0.57	0.65	0.81	0.96	1.12	1.30
84	3.03	4.84	6.66	7.57	9.38	11.20	13.01	15.13
2.13	0.28	0.45	0.62	0.70	0.87	1.04	1.21	1.41
90	3.26	5.22	7.17	8.15	10.11	12.06	14.02	16.30
2.29	0.30	0.49	0.67	0.76	0.94	1.12	1.30	1.52
96	3.49	5.59	7.68	8.73	10.83	12.92	15.02	17.47
2.44	0.32	0.52	0.71	0.81	1.01	1.20	1.40	1.62
102	3.73	5.96	8.20	9.32	11.55	13.79	16.02	18.63
2.59	0.35	0.55	0.76	0.87	1.07	1.28	1.49	1.73
108	3.96	6.34	8.71	9.95	12.33	14.72	17.11	19.89
2.74	0.37	0.59	0.81	0.92	1.15	1.37	1.59	1.85
114	4.19	6.71	9.23	10.53	13.06	15.58	18.11	21.06
2.90	0.39	0.62	0.86	0.98	1.21	1.45	1.68	1.96
120	4.43	7.08	9.74	11.07	13.72	16.38	19.04	22.13
3.05	0.41	0.66	0.91	1.03	1.28	1.52	1.77	2.06

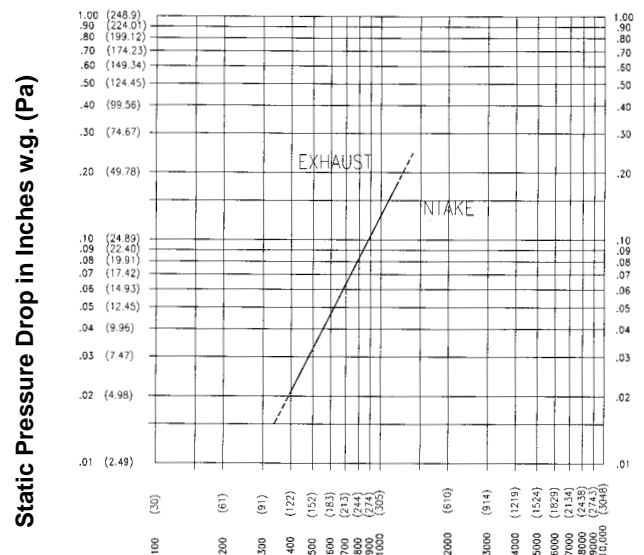
Ratings do not include the effect of a bird screen.

AIR LEAKAGE

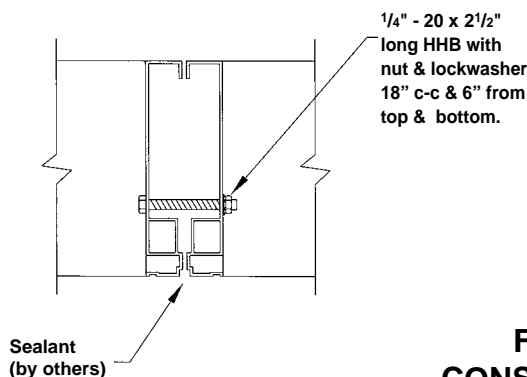
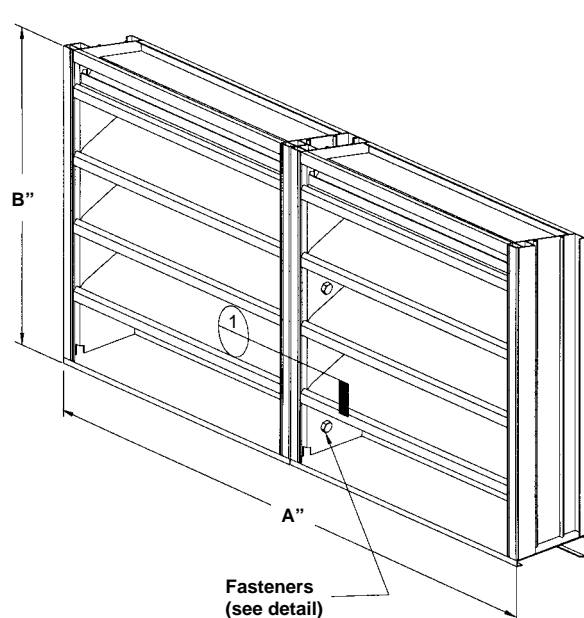


PRESSURE DROP

Test size 48" wide x 48" high (1219 x 1219)

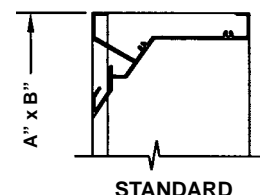


MULTI SECTION ASSEMBLY FIELD SPLICE DETAIL



1. SPLICE DETAIL PLAN

FRAME CONSTRUCTION



QUICK SPEC

GENERAL

Furnish and install at locations shown on the plans or as described in schedules combination drainable stationary louver and low leak damper meeting the performance criteria established by the Florida Building Code and Miami-Dade County, Combination louvers shall be certified to FBC standards TAS 201 (Large Missile Impact), TAS 202 (Uniform Static Air Pressure) and TAS 203 (Cyclic Wind Loading). Combination louvers shall be manufactured in an ISO 9001 certified factory.

Combination louvers shall be furnished with bird and/or insect screens, electric, pneumatic, or manual actuators, supports and finishes as specified and as required for a complete installation. Combination louvers shall incorporate drainable stationary blade and separate adjustable airfoil damper blade in a single frame. All blades and frames shall be constructed of 6063-T5 aluminum alloy.

MATERIAL

Combination louvers shall be 6" (152) deep. Stationary blades shall be .081" (2.1) and adjustable airfoil damper blades shall be .140" (3.0) normal wall thickness. Frames shall be heavy duty .125" (3.2) wall thickness. Integral gutters shall be incorporated into stationary blades, louver head and jamb frames.

PERFORMANCE

The louver shall be AMCA certified for Water Penetration and Air Performance conforming to the following minimum requirements: Free Area: 6.91 Square Feet (0.64 m²).

Maximum pressure drop at 1000 fpm (305 m/min): 0.14" w.g. (0.35 kPA).

Free Area Velocity at Beginning Point of Water Penetration: Over 1250 fpm (+381 m/min).

STRUCTURAL DESIGN

Integral structural supports shall be designed and furnished by the louver manufacturer to carry a wind load of not less than 110 psf (5.27 kPA).

FINISH

Combination louvers shall be finished as specified by the architect. Painted finishes shall include the following minimum requirements. All Kynar finishes shall be applied at 1.2 mil total dry film thickness and meet the following AAMA standards. 70% Kynar finishes shall meet AAMA 2605-02 for organic coatings and exterior aluminum finishes requiring 10 years of South Florida exposure. 50% Kynar finishes shall meet AAMA 2604-02 for organic coatings and exterior aluminum finishes requiring 5 years of South Florida exposure.

Louver manufacturer shall provide 20 year limited warranty for fluoropolymer-based finishes. 10-year warranties shall not be acceptable. Finish coating shall not peel, blister, chip, crack or check. Chalking, fading or erosion of finish shall be measured by the following tests:

Chalking: Finish coating shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D4214.

Color fading: Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D2244 and ASTM D822.

Erosion: Finish coating shall not erode at a rate in excess of .01 mils/year as determined by Florida test sample.

This warranty shall begin on the date of material shipment.

Combination Louver shall be Ruskin model ELC6375DXD.

(Consult www.ruskin.com for electronic version of this "Quick" spec as well as for complete 3- part CSI MasterFormat Specifications).

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